UNIVERSITY OF TORONTO
3 1761 01569125 6

Digitized by the Internet Archive
in 2012 with funding from
University of Toronto

http://archive.org/details/medicalservicesg04macp

WM 01
0328

[Official history of the War.]

HISTORY OF THE GREAT WAR

BASED ON OFFICIAL DOCUMENTS

MEDICAL SERVICES. GENERAL HISTORY

VOL. IV

MEDICAL SERVICES DURING THE OPERATIONS ON THE GALLIPOLI PENINSULA; IN MACEDONIA; IN MESOPOTAMIA AND NORTH-WEST PERSIA; IN EAST AFRICA; IN THE ADEN PROTECTORATE, AND IN NORTH RUSSIA. AMBULANCE TRANSPORT DURING THE WAR.

BY

MAJOR-GENERAL SIR W. G. MACPHERSON,
K.C.M.G., C.B., LL.D.,

AND

MAJOR T. J. MITCHELL, D.S.O.,
ROYAL ARMY MEDICAL CORPS.

190724
31/9/24.

LONDON:
PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE.
To be purchased directly from H.M. STATIONERY OFFICE at the following addresses:
Imperial House, Kingsway, London, W.C.2, and 28, Abingdon Street, London, S.W.1;
York Street, Manchester; 1, St. Andrew's Crescent, Cardiff;
or 120, George Street, Edinburgh;
or through any Bookseller.

1924.

Price 25*s.* 0*d. Net.*

UH
258
1914/18
M32
V.4

CONTENTS.

CHAPTER		PAGE
	List of Sketch Maps, Charts, etc.	v.
	List of Abbreviations	xi.
	Preface	xiii.
I.	The Medical Services during the Operations on the Gallipoli Peninsula	1
II.	The Macedonian Front	62
III.	The Medical Situation on the Macedonian Front	73
IV.	The Medical Services during the Battles of the British Salonika Force	114
V.	The Medical Situation in the British Salonika Force after the Armistice	149
VI.	The Operations in Lower Mesopotamia	163
VII.	The Advance on Baghdad in 1915	195
VIII.	Operations for the Relief of Kut-al-Amara ..	203
IX.	Medical Arrangements during the Siege of Kut-al-Amara	232
X.	The Re-organization of the Medical Services in Mesopotamia in 1916	246
XI.	The Operations leading to the Occupation of Baghdad in 1917	273
XII.	The Medical Services during the Occupation of Nasiriya, 1916–1917	308
XIII.	The Medical Services after the Occupation of Baghdad	320
XIV.	The Medical Services during Operations in Upper Mesopotamia	359
XV.	The Medical Services during Operations on the Euphrates in 1917 and 1918	381
XVI.	The Medical Services during Operations in North-West Persia	400
XVII.	The Operations in East Africa in 1914 and 1915..	416
XVIII.	The Operations in East Africa in 1916	428
XIX.	The Operations in East Africa in 1917	469
XX.	The Conclusion of the Operations in East Africa	493
XXI.	The Medical Services during the Operations in the Aden Protectorate	505
XXII.	The Campaign in North Russia	512
XXIII.	Ambulance Transport during the War	560

(10916) Wt. 7989/5074 1500 5/24 Harrow G.45.

CONTENTS—*continued.*

		PAGE
Appendix A.	Recommendations of Committee appointed in March 1919 to consider Organization of Medical Services for Operations in Mesopotamia	667
,, B.	Medical Unit of a Mobile Column in North Russia	669
I.	Establishment and Equipment	669
II.	Details of Equipment	670
III.	Equipment of a Relay Post	671
,, C.	Awards of the Victoria Cross, Albert Medal, Distinguished Service Order, Military Cross, Military Medal, Distinguished Conduct Medal and Meritorious Service Medal to Officers and Other Ranks of the Medical Services during the War ..	672
Index		685

LIST OF SKETCH MAPS.

		PAGE
Sketch Map of the Area of Operations on the Gallipoli Peninsula	*In text*	3
Sketch Map of Gallipoli Peninsula, showing the Positions of Landing Beaches S, V, W, X, Y and Z, 28th April, and A, B and C, 8th August 1915	,,	8
Sketch Map showing the British Medical Positions at Helles	,,	24
Sketch Map showing the Medical Positions at Anzac	,,	30
Sketch Map of Suvla Front showing the General Positions occupied by Medical Units from the Landings on 7th August to the Withdrawal on 19th December 1915	*To face*	49
Sketch Map of the Area of Operations in Macedonia	,,	63
Sketch Map showing the Medical Arrangements for Collection and Evacuation of Sick and Wounded from the Entrenched Camp at Salonika, February 1916	,,	75
Sketch Map of the Medical Arrangements and Routes of Evacuation of a Brigade Area in the Krusha Balkan, August–September 1917	,,	84
Sketch Map of the Bralo–Itea Line of Evacuation to Italy	*In text*	93
General Map of Salonika Base, showing Position of Medical Units, 1918	*To face*	98
Sketch Map of the Medical Posts during the Withdrawal of the 10th Division from Serbia, December 1915	*In text*	115
Map of the Doiran Front, showing the Disposition of 26th Division Medical Units and Road Communications in August 1916	*To face*	118
Sketch Map showing the Positions of No. 66 Field Ambulance at the Battle of Machukovo, September 1916	*In text*	121
Sketch Map showing the Medical Arrangements of the XVIth Corps during the Operations in the Struma Valley, October 1916	,,	128
Sketch Map showing the Medical Situation of the XIIth Corps during Operations on the Doiran Front, April and May 1917	*To face*	132
Sketch Map showing the Scheme of Evacuation from the XVIth Corps, September 1917, Summer Positions	*In text*	139
Map of Disposition of the Field Ambulances of the 27th Division in the Struma Valley, Winter, 1917–18	,,	140
Medical Situation of the 27th Division on the Struma, April 1918	*To face*	141
Medical Situation of the British Salonika Army, 18th September 1918	,,	142
Medical Situation on the Doiran Front at the time of Final Operations	,,	144
Sketch Map of Area of Operations of the British Salonika Army and Army of the Black Sea	*In text*	151
Sketch Map of Mesopotamia	*To face*	164
Sketch Map of Lower Mesopotamia	*In text*	168
Sketch Map showing the Position of Troops in the Battles of Shaikh Saad, the Wadi and Omm al Hanna	,,	205

List of Sketch Maps—*continued.*

		PAGE
Sketch Map showing Position of Medical Units at Ora, February 1916	*In text*	218
Sketch Map showing the Positions of Troops and Medical Units during the Attack on the Dujaila Redoubt, 8th March 1916	,,	221
Sketch Map showing the Turkish Positions at Kut, December 1916–February 1917	,,	283
Sketch Map showing the Route by which Casualties were evacuated from the Action at Mohammed Abdul Hassan	,,	286
Sketch Map showing the Positions of Field Ambulances during the Hai Riverhead Operations, January 25th–February 3rd, 1917	,,	291
Sketch Map showing the Advance from Kut to Baghdad, 1917	,,	299
Sketch Map of the Scheme of Evacuation of Sick and Wounded to Baghdad, March 1917	,,	323
Sketch Map of the Area of Operations for the Consolidation of Baghdad	,,	326
Sketch Map of Upper Mesopotamia, Jabal Hamrin Area	,,	364
Sketch Map of the Area of Operation North of the Jabal Hamrin	,,	370
Sketch Map of the Operations against Tuz Khurmatli	,,	371
Sketch Map of the Route from Tekrit to Mosul	,,	377
Sketch Map showing the Disposition of Medical Units and the Routes of Evacuation of Casualties during the Battle of Ramadi, September 1917	,,	382
Sketch Map showing the Disposition of Medical Units and Route of Evacuation of Casualties during the Action at Khan Baghdadi and the Raid on Haditha and Ana, 1918	,,	391
Sketch Map showing the Lines of Communication in North-West Persia	,,	403
Sketch Map of German East Africa	,,	417
Sketch Map of the Northern Area of German East Africa	*To face*	429
Sketch Map of the Moschi-Taveta-Kahe Area	*In text*	432
Sketch Map showing the Routes used for Evacuating Sick and Wounded in East Africa at the end of September 1916	,,	447
Sketch Map of the Nguru and Uluguru Areas	,,	451
Sketch Map of the Area of Operations on the Mgeta	,,	471
Sketch Map of the Mohoro-Kibata-Kitambi Area	,,	472
Sketch Map of the Kilwa-Lindi Area	,,	483
Sketch Map of the Aden Protectorate	,,	506
Sketch Map of North Russia	*To face*	513
Sketch Map showing the Medical Arrangements for the Advance on Segeja, North Russia	*In text*	527
Sketch Map showing the Lines of Withdrawal of the British Force in North Russia	,,	539
Sketch Map showing the Different Sectors of the Inner Defence Line organized at Archangel	,,	550

LIST OF CHARTS AND DIAGRAMS.

		PAGE
Chart showing the Number of Beds Equipped and Vacant and the Number of Patients in Hospitals in the British Salonika Force from December 1915 to December 1918 ..	*To face*	95
Chart showing the Number of Beds Equipped and Vacant and the number of Patients in Convalescent Depôts in the British Salonika Force from February 1916 to December 1918	,,	96
Chart showing the Weekly Incidence of Malaria, British Salonika Force, January 1916–December 1918	,,	109
Diagrammatic Sketch showing the Method of Protecting the Sick and Wounded Convoy during the Retirement from Dujaila	*In text*	221
Diagram illustrating the Crossing of the River Tigris, February 22nd and 23rd, 1917	,,	295
Diagram of the Scheme of the Administrative Medical Services in Mesopotamia in 1917	,,	337
Chart showing the Rainfall recorded in Inches during 1916 at Iringa and at Mahenge, East Africa	,,	464
Chart showing Weekly Numbers of Sick in Hospital during 1916 (April–December) in East Africa	,,	466
Scheme of Evacuation from Iringa to Dodoma	,,	467
Diagram of the Scheme of Evacuation prepared by the Director of Medical Services, East Africa, in May 1917 ..	*To face*	478
Diagram showing the Medical Arrangements for the Operations in July 1917 in East Africa..	*In text*	484
Diagram of the Route for Evacuating Sick and Wounded from "Hanforce" and "Linforce," East Africa	,,	487
Diagram showing the Medical Arrangements for the Operations in October 1917, East Africa	*To face*	488
Diagram of the Medical Administrative Organization in East Africa in 1917	,,	500
Diagram showing the Medical Arrangements for the Evacuation of Wounded from a Mobile Column, North Russia..	*In text*	521
Diagram illustrating the Shortest Route of Evacuation in North Russia after an Objective had been gained ..	,,	526
Diagram showing the Medical Organization of the "Syren" Force, North Russia, in August 1919	,,	543

PHOTOGRAPHS.

178 Photographs to illustrate Chapters I–IV, VI–XVI, XVIII–XX, XXII–XXIII.

ILLUSTRATIONS OF AMBULANCE TRANSPORT.

			PAGE
Fig. 1.	Mosquito Nets and Trestles for Stretchers	*In text*	561
Fig. 2.	Bed Stretchers	,,	,,
Fig. 3.	" Fowler " Position Rests for Abdominal Cases ..	,,	562
Fig. 4.	Rests for Chest Cases	,,	,,
Fig. 5.	Method of Carrying Waterproof Sheet and Blanket with Stretcher	*To face*	,,
Fig. 6.	Method of Rechauffement		
Fig. 7.	Suspension Apparatus for Fracture Cases of Lower Extremity	*In text*	563
Fig. 8.	Walton's " Hospital " Stretcher	,,	,,
Fig. 9.	Diagram of Trench Traverse showing difficulty of negotiating angles with Regulation Field Stretcher	,,	567
Fig. 10.	Rogers' Trench Stretcher	,,	568
Fig. 11.	Aubrey's Stretcher	,,	569
Fig. 12.	The Goodacre Stretcher	,,	,,
Fig. 13.	The Willis Stretcher	,,	570
Fig. 14.	The Colt Stretcher	,,	,,
Fig. 15.	The Johnstone-Stirling Webbing Trench Stretcher ..	,,	,,
Fig. 16.	The Graves Stretcher	,,	571
Fig. 17.	The Langley Jones Stretcher	,,	,,
Fig. 18.	The Welsh Stretcher	,,	,,
Fig. 19.	The Butler Stretcher	,,	,,
Fig. 20.	The Meek Stretcher	,,	572
Fig. 21.	The Grant Stretcher	,,	,,
Fig. 22.	The Neil Robertson Stretcher	,,	573
Fig. 23.	The Sussex Yoke Stretcher	,,	574
Fig. 24.	The Withers Stretcher	,,	,,
Fig. 25.	Cavalry Stretcher (with description)	,,	575
Fig. 26.	Detail of Cavalry Stretcher	,,	576
Fig. 27.	Light Folding Dhoolie devised by Major D. S. Skelton, showing it closed, together with method of carriage	,,	577
Fig. 28.	Showing Manner of Carrying Light Folding Dhoolie when loaded	,,	578
Fig. 29.	The McCormack-Brook Stretcher Carrier	,,	579
Fig. 30.	The Miller-James Stretcher Carrier	,,	580
Fig. 31.	The Miller-James Stretcher Carrier closed	,,	581
Fig. 32.	The Blackham Stretcher Carrier	,,	,,
Fig. 33.	TheWalker Stretcher Carrier	,,	,,
Fig. 34.	The Luce Mono-wheel Stretcher Carrier	,,	582
Fig. 35.	The Close Folding Stretcher Carrier	,,	583
Fig. 36.	The Streatfield Stretcher Carrier	,,	,,
Fig. 37.	The Grieveson Stretcher Carrier	,,	584
Fig. 38.	The Hudlass and Smith Stretcher Carrier	,,	,,

Illustrations of Ambulance Transport—*continued.*

		PAGE
Fig. 39. The Victor Stretcher Carrier	*In text*	585
Fig. 40. The Day Modification of the Victor Stretcher Carrier	,,	,,
Fig. 41. The Jennings Stretcher Carrier	,,	,,
Fig. 42. The Furber Field Stretcher Carrier	,,	586
Fig. 43. The St. John Litter Under-Carriage (1915)	,,	587
Fig. 44. The French type of Double Wheel Stretcher Carrier ..	,,	,,
Fig. 45. The Kedstone Wheeled Stretcher Carrier	,,	588
Fig. 46. The Parnacott Bicycle Stretcher Carrier	,,	,,
Fig. 47. The Puisais (French Army) Stretcher Carrier ..	,,	,,
Fig. 48. Lewis Gun Hand-Cart converted into a Wheeled Stretcher Carrier	,,	,,
Fig. 49. Greenleaf Travois with Swingle-Tree	,,	589
Fig. 50. Litter carrying Two Stretchers	,,	590
Fig. 51. Combined Litter and Travois	,,	591
Fig. 52. Travois Shoe	,,	592
Fig. 53. Travois loaded	,,	593
Fig. 54. Litter loaded	,,	,,
Fig. 55. Cover for Travois or Litter	,,	594
Fig. 56. Stretcher carried Crosswise on a Mule	,,	595
Fig. 57. Stretcher carried Lengthwise on a Mule	,,	,,
Fig. 58. Regulation Mule Cacolet	,,	596
Fig. 59. Saddlery for Litter	,,	597
Fig. 60. Detail of Saddlery for Litter	,,	,,
Fig. 61. Regulation Camel Cacolet for Sitting Patients ..	,,	598
Fig. 62. Diagram of Improvised Camel Sitting Cacolet ..	,,	599
Fig. 63. Improvised Camel Cacolet for Lying-down Patients ..	,,	600
Fig. 64. Plan of Improvised Camel Cacolet	,,	,,
Fig. 65. Turkish Pattern Camel Cacolet for Lying-down Patients	,,	601
Fig. 66. British Pattern of Metal and Canvas Cacolet for Lying-down Patients	,,	602
Fig. 67. Plan of Turkish Pattern Camel Cacolet	,,	603
Fig. 68. Camel Lying Cacolet in use	,,	,,
Fig. 69. Original Pattern of Sand-Sledge designed by the Australian Corps	,,	604
Fig. 70. Later Pattern of a Sand-Sledge	,,	605
Fig. 71. Pony Sledge, North Russia	,,	606
Fig. 72. Reindeer Sledge, North Russia	,,	,,
Fig. 73. Dog Sledge, North Russia	,,	,,
Fig. 74. Man Haulage Sledge, North Russia	,,	607
Fig. 75. Method of carrying a Miller-James Stretcher Carrier in a Mark I Light Wagon	,,	610
Fig. 76. Rapid Transit One-Horse Ambulance Wagon ..	,,	611
Fig. 77. Section of Rapid Transit One-Horse Ambulance Wagon	,,	612
Fig. 78. Rapid Transit One-Horse Wagon with Hood ..	,,	,,
Fig. 79. Benares Tonga	,,	613
Fig. 80. Sand Carts moving across the Desert	,,	614

Illustrations of Ambulance Transport—*continued.*

		PAGE
Fig. 81. Sand Carts showing Wagons Parked and Wheels Boxed	*In text*	615
Fig. 82. Diagram of a Sand Cart	,,	616
Fig. 83. Interior of Motor Ambulance Car	,,	619
Fig. 84. Diagram of Stretcher Suspension for Motor Ambulances	,,	626
Fig. 85. The Teleferica Railway used in Italy	,,	628
Fig. 86. Shipping Ambulance Train Coaches	,,	629
Fig. 87. Block Plan of a Standard Ambulance Train in France	*To face*	639
Fig. 88. Tramways	,,	647
Fig. 89. Plan of Trench Tramway Terminus at Advanced Dressing Station	,,	647
Fig. 90. Section of Dug-out A.	,,	647
Fig. 91. Trolley for Trench Tramways in France	*In text*	648
Fig. 92. Hospital Truck, Decauville Railway, France	,,	650
Fig. 93. Truck, Decauville Railway, Mesopotamia	,,	651
Fig. 94. Hospital Motor Car used on Light Railway, Ruz-Baghdad, Mesopotamia	,,	652
Fig. 95. Diagrammatic Sketch of Boats used on Doiran Lake for the Evacuation of Sick and Wounded	,,	653
Fig. 96. Improvised Hospital Mahela, Euphrates Front, Mesopotamia	*To face*	654
Fig. 97. Ambulance Barge used by the British Expeditionary Force in France, 1915–1918	,,	657
Fig. 98. H.M. Class of River Hospital Steamer	*In text*	661
Fig. 99. Ward in H.M. Type of Steamer showing Arrangements of Berths which caused difficulty in handling Stretcher Cases	,,	662
Fig.100. Operating Theatre on H.M. Class of Steamer	,,	663
Fig.101. H.P. Class of Hospital Steamer	,,	664

ABBREVIATIONS.

A.A.M.C.	Australian Army Medical Corps.
A.D.M.S.	Assistant Director of Medical Services.
A.D.S.	Advanced Dressing Station.
A.G.	Adjutant-General.
A.M.S.	Army Medical Service.
A. & N.Z.A.C. ..	Australian and New Zealand Army Corps.
A.Q.M.G.	Assistant Quartermaster-General.
A.T.	Army Transport.
B.F.A.	British Field Ambulance.
B.G.H.	British General Hospital.
B.R.C.S.	British Red Cross Society.
B.S.H.	British Stationary Hospital.
C.A.M.C.	Canadian Army Medical Corps.
C.C.F.A.	Combined Cavalry Field Ambulance.
C.C.H.	Combined Clearing Hospital.
C.C.S.	Casualty Clearing Station.
C.F.A.	Combined Field Ambulance.
C.G.S.	Chief of the General Staff.
D.A.D.M.S. ..	Deputy Assistant Director of Medical Services.
D.A.G.	Deputy Adjutant-General.
D.D.M.S. ..	Deputy Director of Medical Services.
D.D.M.S. L. of C.	Deputy Director of Medical Services, Lines of Communication.
D.G.A.M.S. ..	Director-General, Army Medical Service
D.G.M.S.	Director-General of Medical Services.
D.M.S.	Director of Medical Services.
E.A.M.C.	Egyptian Army Medical Corps.
E.M.O.	Embarkation Medical Officer.
F.A.	Field Ambulance.
G.H.Q.	General Headquarters.
G.O.C.	General Officer Commanding.
G.O.C. in C. ..	General Officer Commanding in Chief.
G.S.	General Service.
H.M.S.	His Majesty's Ship.
H.S.	Hospital Ship.
H.T.	Hospital Transport.
I.C.S.	Indian Civil Service.
I.F.A.	Indian Field Ambulance.
I.G.C.	Inspector General of Communications.
I.G.H.	Indian General Hospital.
I.M.S.	Indian Medical Service.
I.S.H.	Indian Stationary Hospital.
I.S.M.D.	Indian Subordinate Medical Department.
I.W.T.	Inland Water Transport.
M.A.C.	Motor Ambulance Convoy.

ABBREVIATIONS—*continued*.

M.E.F.	Mediterranean Expeditionary Force.
M.O.	Medical Officer.
M.T.	Mechanical Transport.
N.C.O.	Non-Commissioned Officer.
N.T.O.	Naval Transport Officer.
N.Y.D.	Not Yet Diagnosed.
N.Z.M.C.	New Zealand Medical Corps.
O.C.	Officer Commanding.
O.R.	Other Ranks.
P.D.M.S.	Principal Director of Medical Services.
P.M.O.	Principal Medical Officer.
P.O.W.	Prisoners of War.
P.U.O.	Pyrexia of Uncertain Origin.
Q.A.I.M.N.S. ..	Queen Alexandra's Imperial Military Nursing Service.
Q.A.M.N.S. for India.	Queen Alexandra's Military Nursing Service for India.
Q.M.G.	Quartermaster-General.
R.A.F.	Royal Air Force.
R.A.M.C. ..	Royal Army Medical Corps.
R.A.O.C.	Royal Army Ordnance Corps.
R.A.P.	Regimental Aid Post.
R.A.S.C.	Royal Army Service Corps.
R.E.	Royal Engineers.
R.F.A.	Royal Field Artillery.
R.F.C.	Royal Flying Corps.
R.H.A.	Royal Horse Artillery.
R.N.	Royal Navy.
R.N.A.S.	Royal Naval Air Service.
R.N.V.R. ..	Royal Naval Volunteer Reserve.
R.T.O.	Railway Transport Officer.
S.A.M.C.	South African Medical Corps.
S.M.O.	Senior Medical Officer.
S.S.	Steam Ship.
T.A.B.	Mixed Typhoid and Paratyphoids A and B Vaccine.
T.A.T.	Temporary Ambulance Train.
T.F.	Territorial Force.
V.A.D.	Voluntary Aid Detachment.
W.A.M.C. ..	West African Medical Corps.
Y.M.C.A. ..	Young Men's Christian Association.

PREFACE.

THE greater part of this, the final volume of the General History of the Medical Services during the war, has been compiled by Major T. J. Mitchell, to whom was allotted the task of preparing the chapters dealing with the Medical Services during the campaigns in Mesopotamia, East Africa, Aden, and North Russia. The chapter on Ambulance Transport has also been compiled by him ; and, without this assistance, it would not have been possible to complete the history within the time limit. Major Mitchell has also acted as assistant to the Editor-in-Chief and rendered invaluable assistance during the whole period in which the volumes of the Official Medical History of the War have been prepared. The chapter dealing with the medical arrangements during the siege of Kut-al-Amara has been compiled from notes supplied by Major-General Sir P. Hehir, I.M.S., and Major W. L. E. Fretz, R.A.M.C.

The history of the medical services in each of the campaigns recorded in the volume presents special features for study. In the Dardanelles Campaign organized evacuation of sick and wounded by sea, and the problems of sanitation on a very restricted and overcrowded area under hostile fire, were the all-important considerations. In Macedonia the dominant feature was warfare in mountainous country or in river valleys and ravines, the hot-beds of malaria. These required the organization of special ambulance transport for sick and wounded over mountain tracks, and extensive measures for combating a disease that threatened to repeat, in the history of the campaign, the disaster of the Walcheren Expedition of 1809. In Mesopotamia the effects of extremes of heat and cold, the organization of river and desert transport, the problems of disease prevention generally and a variety of administrative difficulties were prominent features. East Africa was typical of a campaign in a tropical and bush country with troops operating in columns over a vast area against an elusive and mobile enemy, and exposed to all kinds of tropical diseases. North Russia on the other hand was of exceptional interest,

as there the medical services had the unusual experience of working for a great part of the year in an Arctic region over trackless, snow-clad and ice-bound regions. All these campaigns, therefore, are deserving of study by the student of military medical history.

It was not surprising that the medical services in some of these areas failed to show, at any rate at first, the high state of organization and efficiency that characterized the campaigns in France, Belgium and elsewhere. There were definite breakdowns in the Dardanelles, Mesopotamia and East Africa, leading to Parliamentary enquiry or special War Office missions to report on the measures taken for the care of the sick and wounded and the prevention of disease. Although in some respects the administration of the medical services was a factor in the breakdowns, the chief lesson to be learnt from the study of these campaigns from a military medical standpoint is the need of a close liaison between the medical administration and the General Staff from the very first, and clear and definite preparations before the campaign is embarked upon to meet all possible contingencies of sickness or battle casualties, such as methods and quantity of ambulance transport, completeness, mobility and training of field medical units, schemes of evacuation of sick and wounded, sufficiency of hospital accommodation, and measures for disease prevention. When expeditionary forces engage in warfare in regions and climates such as those described in this volume before careful attention is paid to such matters, a breakdown in the medical services is bound to occur and much suffering and hardship will be the lot of the sick and wounded. Further, the efficiency of the fighting troops, which must always be the chief consideration of the responsible military authorities, will be very materially affected. Major Mitchell's chapters on Mesopotamia and East Africa contain many points which emphasize this lesson ; as do also the published reports of the Mesopotamia and Dardanelles Commissions.

Much difficulty has been experienced in producing sketch maps, in which names of places could correspond with a recognized nomenclature. This has been felt especially in connection with the campaigns recorded in this volume ; and all that has been attempted has been to introduce sketch maps which will indicate approximately the position of places mentioned in the text.

The compilers are much indebted to several officers for reading the manuscript and for assistance in other directions,

chiefly to Lieut.-General Sir W. P. Braithwaite and Major-General C. McGrigor for the chapter on the Dardanelles; to General Sir G. Milne for the chapters on Macedonia; to Major-General Sir H. T. Brooking, Major-General Sir F. H. Treherne, Major-General Sir W. M. Thomson, Brig.-General F. J. Moberly and Brig.-General E. W. Costello, V.C., for the chapters on Mesopotamia; to Colonel C. F. Dobbs and Colonel Andrew Balfour for the chapters on East Africa; to Major-General Sir W. E. Ironside and Colonel G. St. C. Thom for North Russia, and to Colonel Sir Matthew Fell for the chapter on Ambulance Transport. Brig.-General J. E. Edmonds has again, as in all previous volumes of the General History, been of very great assistance with his advice and valuable suggestions.

The illustrations have been obtained from several sources, official and private, and acknowledgements are due to the Imperial War Museum and Lieut.-Colonel F. S. Brereton for photographs illustrating the Dardanelles and Macedonian campaigns; to Colonel G. H. Edington for eight photographs of the Helles Front on the Gallipoli Peninsula; to the Wellcome Bureau of Scientific Research, through Colonel Balfour, for photographs from Mesopotamia and East Africa; to Mr. H. J. Bell and Mr. D. Stewart for preparing the maps and diagrams illustrating the chapter on East Africa; to Sir F. H. Treherne, Colonels S. M. Moens, Sir W. Willcox, T. P. Legg, Sir M. Fell and W. A. Woodside for illustrations from Mesopotamia; to Messrs. Cassell & Co. for permission to reproduce the illustration on page 208; to the Director-General Army Medical Service and Major E. L. Moss for illustrations from North Russia; and to Colonel H. Wade, Lieut.-Colonel J. Young, Captain W. Brown, Sir J. H. Biles & Co., Messrs. Selwyn & Blount, the Minerva Motors, Ltd., and the Sunbeam Motor Co. for supplying various illustrations that appear in the chapter on Ambulance Transport.

In this final volume the Editor-in-Chief also desires to acknowledge the valuable and loyal services, rendered in the preparation of the eleven volumes of the History of the Medical Services, by his staff, especially to Miss G. M. Smith, M.A., who throughout has ably supervised the work of passing the volumes through the press and has been of great assistance in proof-reading and secretarial work generally; to the indexer of all but two of the volumes, Miss A. Mackean, working under the instruction of Mr. F. J. Hudleston, the War Office librarian, who has also helped in many ways; to

Mr. J. J. Bishop (late Dorset Regiment) and Miss M. Ross, who has also had charge of the documents and helped in proof-reading, for the preparation of maps and charts; to Mr. T. Slaney (late R.A.M.C.) who has throughout acted as Chief Clerk, and to Mr. A. R. R. Craig (late R.A.M.C.) who carried out most of the work of extracting information from the war diaries.

Grateful acknowledgements are also due to the Controller of H.M. Stationery Office and his Staff for assistance and advice in preparing the volumes for the Press.

Although this concludes the work for which the Editor-in-Chief has been responsible, statistical tables of sickness and wounds, and the history of the medical services during operations on the North-West Frontier of India have still to be recorded, before a history of the medical services during the Great War can be regarded as complete.

August, 1923. W. G. M.

CHAPTER I.

THE MEDICAL SERVICES DURING THE OPERATIONS ON THE GALLIPOLI PENINSULA.

ON the 28th January 1915 the War Council sanctioned a naval attack on the Dardanelles, but without the support of any military forces. Bombardments by the fleet were subsequently carried out on the 19th and 25th February and early in March, but the main attack to force the Dardanelles was not made till the 18th March, and before this took place it was decided to send a military force to co-operate with the Navy. Lieut.-General Sir W. Birdwood, then in Egypt, had been sent on 23rd February to the Dardanelles to reconnoitre, and on 12th March General Sir Ian Hamilton was appointed to command an Expeditionary Force, designated the Mediterranean Expeditionary Force. He left England with his General Staff on 13th March, and arrived at Mudros, on the island of Lemnos, on the 17th of the month. His administrative staff left at a later date, and landed at Alexandria on 1st April. Lemnos, a bare and sparsely populated island about 60 miles from the Gallipoli Peninsula, with a fine bay called after the village of Mudros, had been provisionally selected as the base of the force, and the Royal Naval Division from England, and the 3rd Brigade of the Australian Division from Egypt, together with a French division, began to arrive there on the 4th March. In the meantime, on the 24th February, the Director-General of the Army Medical Service had nominated Colonel J. Maher to be D.M.S. of the expedition, but as its nature and destination were still kept officially secret he was merely ordered to Malta. He took with him an A.D.M.S., Lieut.-Colonel Thom, and a D.A.D.M.S. for Sanitation, Lieut.-Colonel Dorgan, R.A.M.C. He received no instructions, verbal or otherwise, until he reached Malta, when he was ordered to proceed to Mudros and report on the suitability of Lemnos as a base from a medical and sanitary point of view. He arrived at Mudros on 15th March, and reported that Lemnos was unsuitable on account of insufficiency of water. While there he met Sir Ian Hamilton, who, after hearing his report and one made by Brig.-General C. McGrigor, the commandant of the base, decided to move the base to Alexandria, Lemnos not being considered a suitable place. Consequently Colonel Maher proceeded to Alexandria. The R.N. Division and the French Division

were then sent back from Mudros to Egypt. The Australian Brigade, however, remained on transports in Mudros Bay, landing battalions for exercises on shore as opportunity offered. It had been accompanied by No. 1 Australian Stationary Hospital, which had landed and opened on a site near Mudros village, on the east of the bay, for the reception of sick from the transports.

The rest of the force was concentrated in Egypt. It consisted of the 1st Australian Division and the New Zealand and Australian Division, formed as an Anzac Corps under Lieut.-General Sir W. Birdwood, and the 29th Division, organized in England from regular battalions withdrawn from garrisons in India and overseas, under Major-General Hunter Weston.

After the force had concentrated for embarkation at Alexandria and Port Said, Sir Ian Hamilton and his General Staff, who had come back to Alexandria from Mudros, returned to Mudros on 7th April, leaving the administrative staff behind at Alexandria. The medical administration had by this time been complicated by the appointment of another D.M.S., Surg.-General Birrell, who had accompanied the administrative staff to Alexandria on 1st April. He had with him an A.D.M.S., Lieut.-Colonel Keble, but no administrative sanitary officer. Lieut.-Colonel Keble accompanied Sir Ian Hamilton to Mudros, but Surg.-General Birrell, Colonel Maher and his staff remained behind at Alexandria. On the 22nd April the Commander-in-Chief telegraphed for an officer senior to Lieut.-Colonel Keble to join his staff, and Surg.-General Birrell then left Alexandria for General Headquarters, leaving Colonel Maher and his staff at Alexandria.

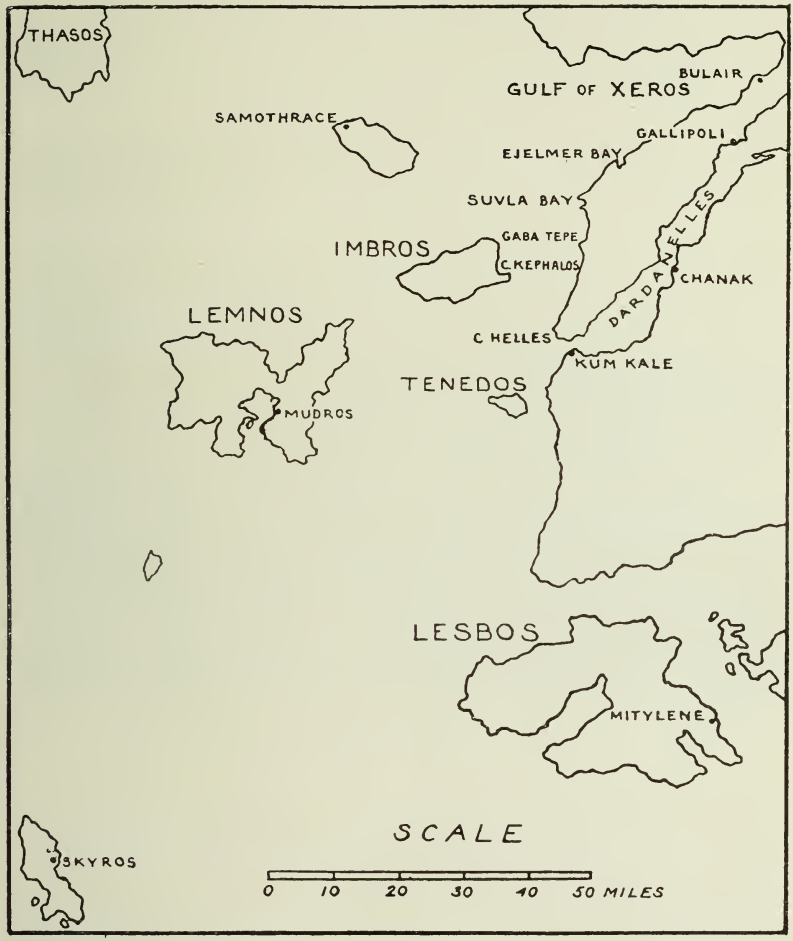
This was the general medical situation at the time the troops sailed from Egypt for the Gallipoli Peninsula.

The 29th Division embarked for Lemnos on 8th April, and arrived at Mudros on 12th April. The R.N. Division embarked on 14th April and went to Skyros, an island off the coast of Greece, some 120 miles south-west of Lemnos. The 1st Australian Division embarked on the 9th April, and the New Zealand and Australian Division on the 12th, for Mudros. The French Division, under General d'Amade, sailed from Egypt about the same time.

The whole of the force, with the exception of the R.N. Division, was thus concentrated on transports in Mudros harbour some days before it landed on the Gallipoli Peninsula.

In order that the conditions may be realized under which the landing was effected a short description of the area of

operations is necessary. The section of the Gallipoli Peninsula over which the campaign was fought extended from the most southerly point, Cape Helles, northwards for about 22 miles to the neighbourhood of Ejelmer Bay. The nose of the Penin-



SKETCH MAP OF THE AREA OF OPERATIONS ON THE GALLIPOLI PENINSULA

sula from its western point, Tekke Burnu, on the Ægean coast, to the entrance of the Dardanelles at Sedd-el-Bahr was only about one and a half miles across. It then widened gradually to a point about fifteen miles north of Cape Helles, when it contracted to a narrow neck of about five miles across

from Gaba Tepe, on the Ægean, to the town of Maidos, four or five miles north of the Dardanelles Narrows. From Gaba Tepe to the northern point of Suvla Bay was a distance of some seven miles. There the Peninsula attained its greatest width of some twelve miles, from the Ægean Sea to the Straits.

The original landings excluded Suvla Bay altogether, and were confined to the beaches east, west and north of Cape Helles, and to the beach north of Gaba Tepe, known as Anzac Cove.

The beaches at the Helles and Anzac landings were narrow strips of sand below overhanging cliffs. On the Helles front the ground sloped upwards to Krithia, a village of considerable size, about five miles from Cape Helles, and connected by a fairly good road with Sedd el Bahr, a village and fort at the entrance to the Dardanelles. The whole extent of the ground from Krithia southwards was commanded by a prominent hill, Achi Baba, which rose to a height of 600 ft. about one and a half miles east-north-east of Krithia. Five miles north of Achi Baba there was a high plateau, the Kilid Bahr plateau, running west from the Narrows to the Ægean, at 700 ft. above sea level. It overlooked the Straits and the Ægean coast. Six miles farther north was the highest peak in the area of operations, Koja Chemen Tepe, on the Sari Bahr range of hills, 971 ft. high. It commanded the beaches north of Gaba Tepe and Suvla Bay. The Kilid Bahr plateau and Sari Bahr were respectively south and north of the narrow neck of land between Gaba Tepe and the Dardanelles.

The whole of this area, more especially the district between Sari Bahr and Gaba Tepe, was exceptionally rugged, covered with thick scrub, and broken into numerous peaks, ridges, gullies and precipitous cliffs. The terrain between Cape Helles and Achi Baba was more open, and has been described as spoon-shaped from the fact that the cliffs along the Ægean coast to Helles were somewhat higher than the ground in the centre, forming as it were the edge of a spoon, although this feature was less marked on the Dardanelles side. At Suvla Bay there was a wide extent of low-lying, bare and open, flattish plain for about one and a half miles inland, when the ground began to rise. Then high grass and bush appeared, the bush being mostly a prickly variety of ilex, very hard and tough. This bush increased in density and height as the hills got higher. But from Suvla point to Ejelmer Bay on the north of this plain there was a long ridge of hills, the Kizlar Dagh, with three marked peaks, the Karakol Dagh, Kiretch Tepe

Sirt and Kartal Tepe, from 400 to 600 feet in height. They overlooked the Gulf of Xeros from Suvla Bay to Ejelmer Bay on the north, and the Ægean Sea and Suvla plain on the south.

A shallow lake, the Salt Lake, roughly a square in shape and about one and a quarter miles across, which is dry in summer but flooded in winter, is connected with Suvla Bay by a short cut at its north-west corner. It occupies a considerable area of the flat land between the sea and the rising ground on the Suvla front.

The numerous ravines and gullies on all fronts, called "*dere*," the Turkish for "valley," are usually dry, but are apt to be

Tekke Burnu, viewed from Lancashire Landing, and showing rows of dug-outs excavated in the face of the cliff.

flooded during rains. Some retain a trickle of water down them at all seasons of the year. The most formidable of these is a ravine, known as the Gully Ravine, which runs in a somewhat zig-zag course, parallel to the Ægean coast and from 200 to 500 yards distant from it, to its mouth at Gully beach on the Ægean, about two miles north of Tekke Burnu.

A few farms surrounded by clumps of trees and patches of cultivated ground were scattered here and there on the Suvla and Helles fronts. The best known of these were "Pink Farm" on the Helles front, the farms Sulajik and Kuchuk Anafarta Ova on the Suvla front, and Susak Kuyu, to the south of the Suvla Bay area and between it and the Anzac front.

Shallow wells and springs of clear water could be found on all fronts, but the amount of water in them was quite inadequate for the requirements of a large force, and the main supply had to be brought to the beaches in lighters and from them pumped into tanks on shore. These tanks were, however, very liable to be damaged by artillery fire, and the supply of water was at all times precarious and the amount allowed to each man daily was extremely small.

The climate on the Peninsula was apt to vary from extreme cold in winter to great heat in summer. Strong winds

View of "V" beach, Helles front.

sprang up suddenly and prevented communication between the ships and the shore. Transhipment from one vessel to another in Mudros Bay was also liable to interruption by these storms.

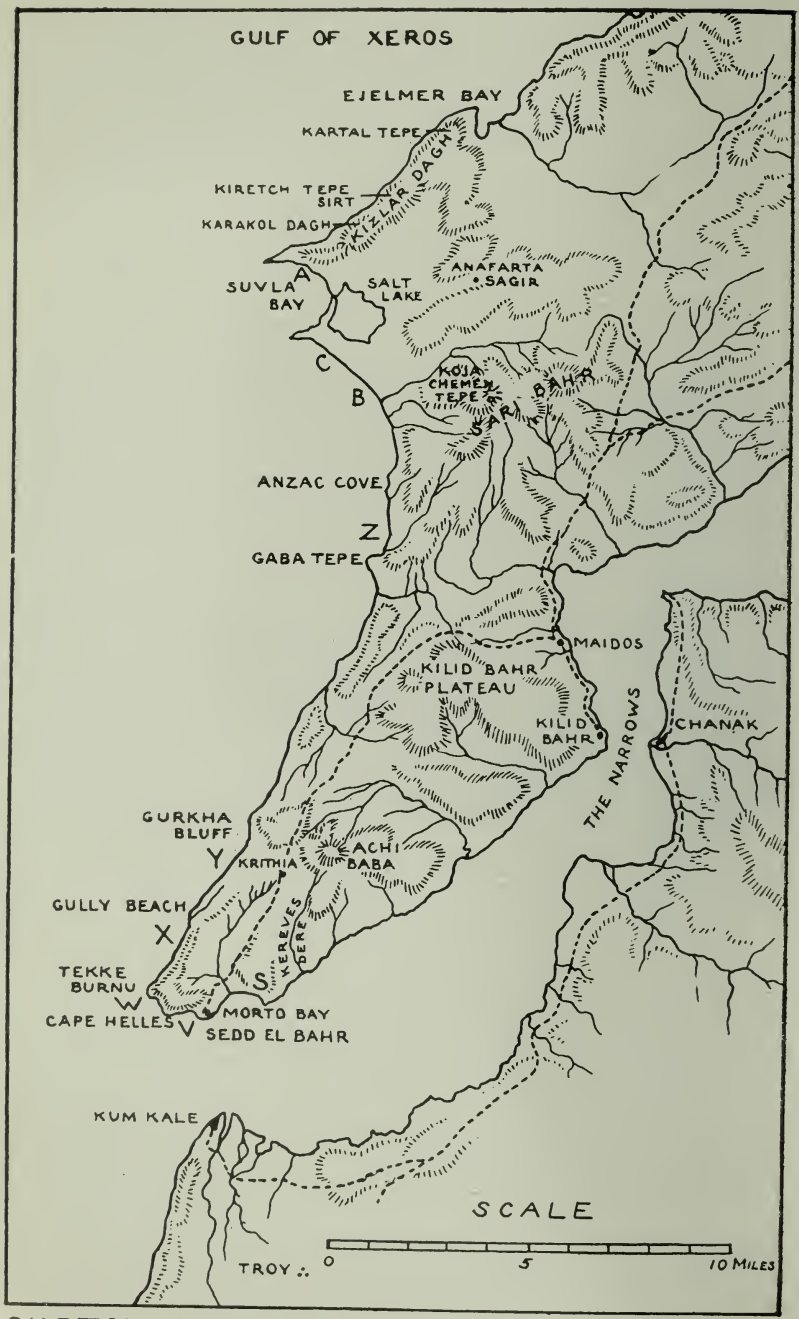
The Expeditionary Force landed on the shores of this rugged and difficult country on Sunday the 25th April. For the landing on the Helles front a series of beaches, lettered S to Y, had been selected. S beach was at the northern end of Morto Bay at the entrance to the Dardanelles, V beach west of Sedd el Bahr, W beach just south of Tekke Burnu, the most western promontory of the nose of the Peninsula, X beach on

the Ægean coast, about one mile north of Tekke Burnu, and Y beach under a steep cliff about two and a quarter miles north of X beach. Z beach was the designation of a beach north of Gaba Tepe, where the Anzac Corps was to land, under the rugged cliffs and gullies leading to the Sari Bahr range of hills.

The task of landing on the Helles beaches was assigned to the 29th Division. A battalion of the R.N. Division was attached to it to co-operate in the landing at Y beach. The remainder of the R.N. Division was to make a feint attack in the Gulf of Xeros, north of the Bulair Lines. The landing

S.S. *River Clyde*, at "V" Beach. Asiatic coast seen in the distance.

at the beach north of Gaba Tepe was to be made by the two divisions of the Anzac Corps. The French division was to land a force on the Asiatic coast near Kum Kale. The intention was for the covering force of the Anzac Corps to secure the heights of Sari Bahr, protect the flank of the main landing, which was to take place at Helles, and advance eastwards to the Dardanelles. The 29th Division on landing at Helles was to advance rapidly northwards and occupy Krithia and Achi Baba. Both forces were then to converge on the Kilid Bahr plateau and secure the entry to the Dardanelles through the Narrows. The French were to land at Kum Kale and silence the enemy guns which commanded from the Asiatic coast Morto Bay and Helles, and then withdraw and join up with the 29th Division at Helles.



SKETCH MAP OF GALLIPOLI PENINSULA
SHOWING THE POSITIONS OF LANDING BEACHES S, V, W, X, Y AND Z, 25TH APRIL, AND A, B AND C 6TH AUGUST 1915

The landings on all the beaches were carried out on 25th April 1915 according to plan, but the enemy resistance was even stronger than expected and no advance as far inland as planned was possible. None of the three objectives, Achi Baba, Sari Bahr and the Kilid Bahr plateau, were reached then or at any time during the campaign. On the evening of the 25th April all the troops were on or near the shore. The battalions which landed at Y beach did not effect a junction as intended with those which landed at X beach, and, abandoning their

An ambulance wagon in Gully Ravine, Helles front.

gains, re-embarked without orders. The only gain of ground at the time was effected by a junction between X and W beach on the top of the cliffs. The French troops withdrew from Kum Kale the following day, after attaining their object, and took up a position on the British right at V beach and Sedd el Bahr, with the British battalion at S beach holding its position on the extreme right of the French.

Fighting of the severest character was continued on the Helles front during the 26th, 27th and 28th April by the 29th and French Divisions. A steady advance inland was made, and by the 27th April a line was held from a beach, known as Gully Beach, where the Gully Ravine debouched on the Ægean

half-way between X and Y beaches, to a point on the Dardanelles just north of S beach. On the 28th April the line was still further advanced to the north of Y beach, and across the Peninsula to a point on a gully, Kereves Dere, on the Dardanelles side, some 2,000 yards north-east of S beach. This new line

A gully on the Anzac front.

was about 2,000 yards short of Krithia and 4,000 yards from Achi Baba. Practically no material advance of the line was made during the remainder of the campaign, the whole of the Helles front occupied by the British and French being thus confined to an area some 6,500 yards in depth from Cape Helles and 5,000 yards at its widest point from north of Y Beach to Kereves Dere.

At the Anzac landing the difficulties were exceptionally great, and involved fighting up gullies, cliffs and ravines covered with thick scrub. Consequently the line was only pushed forward from the beach for a short distance into this rugged hilly country, and, although fighting was more or less constant throughout, did not at any time go further inland than some 2,000 to 3,000 yards east of the Ægean.

The subsequent history of the military operations, so far as it is necessary to describe them in order to understand the medical situation, is briefly as follows. The R.N. Division had come back from its feint attack north of the Bulair Lines on the 26th April and, after landing another battalion at Helles, went to the Anzac front and landed two battalions there on the 28th, and two on the 29th April. Two other battalions went on the same day to Helles. At Helles, on the 1st May, the enemy attacked in force, and for some days the situation there was critical.

On the 1st May the 29th Indian Infantry Brigade, consisting of a Sikh and three Gurkha battalions, together with an Indian Mountain Artillery Brigade, reinforced the 29th Division. During the period of critical fighting in May an Australian Brigade and a New Zealand Brigade were brought to Helles on the 5th of the month from Anzac, and formed, with a composite brigade of two battalions of the R.N. Division and one of the 29th Division and R.N. divisional troops, a Composite Division under Major-General Paris, the G.O.C. of the R.N. Division. On the same day the 42nd (East Lancashire) Division of the Territorial Force, from Egypt, arrived at the Dardanelles and landed at Helles. It relieved in the trenches the 29th Division, which had till then, with the French division, borne the brunt of the fighting. A brigade of the R.N. Division was also attached to the French division on the British right. The Composite Division took part in severe fighting on the 8th, 9th and 10th May in the direction of Achi Baba and suffered heavily. Its Australian and New Zealand brigades returned to the Anzac front on the 20th May, leaving the R.N. Division on the Helles front, where it remained, together with the 42nd Division, till the end of the campaign.

On the 12th/13th May the 29th Indian Infantry Brigade, under Major-General Cox, secured, by a brilliant attack on the part of the 1/6th Gurkha Battalion, the bluff commanding Y beach, from which the troops had been withdrawn after the landing on 25th April. The bluff was subsequently known as Gurkha Bluff and was the most northerly point reached on the Helles front during the British occupation.

The Helles front was still further reinforced by the 52nd (Lowland) Division, from England, on the 19th June.

The Anzac Corps was reinforced by dismounted troops of the Australian Light Horse and the New Zealand Mounted Rifles Brigade, from Egypt, on the 12th and 13th May.

The British divisions on the Helles front, the R.N. Division, 29th and 42nd, with the 29th Indian Infantry Brigade, were organized as a corps formation, the VIIIth Corps, on the 23rd May, and the 52nd Division was added to it in June. Major-General Hunter-Weston, who up till then had commanded the 29th Division, assumed command of the Corps, Major-General de Lisle taking his place in the division. A second French division landed at V beach in May and formed, under General Gouraud,* a French Army Corps, the Corps Expéditionnaire d'Orient.

General Headquarters, during the period of the landings, had been on board the "Queen Elizabeth" and the transport "Arcadian," but the activities of enemy submarines in the last week of May compelled the ships to leave their anchorage off the Peninsula, and G.H.Q. was then established on shore at Kephalos, on the island of Imbros, some twelve miles from Cape Helles. The island of Lemnos and Mudros Bay at the same time became an intermediate base, and, on the 7th June, the headquarters of an Inspector-General of Communications, Major-General A. Wallace. The headquarters of the I.G.C. were on a transport, the "Aragon," in Mudros Harbour. For a short period from the 17th June to the 25th June they were on shore at Mudros, but returned to the "Aragon" on the latter date and remained there till the close of the campaign. Alexandria continued to be the base for reinforcements and supplies. It was under the command of Major-General C. McGrigor, and was some 600 to 700 miles from the area of operations.

No further changes or additions to the forces on Gallipoli Peninsula were made until July and August, when operations on a much larger scale, with a view to securing definitely the passage of the Dardanelles for the fleet, were being planned. On the 6th August, when these operations commenced, a landing was to be effected on new beaches at Suvla Bay by a Corps, the IXth Corps, under Lieut.-General Sir F. Stopford. The Corps was originally composed of three divisions, the 10th, 11th and 13th, of the New Armies which had been undergoing

* General Gouraud was wounded on 30th June and was succeeded in the command by General Bailloud.

training in England. They came direct from England during the first half of July, the 10th Division to Mitylene, on the island of Lesbos, and the 11th and 13th to Lemnos. The latter two divisions were temporarily attached to divisions at Helles in July to gain experience. Two Territorial divisions, the 53rd (Welsh) and the 54th (East Anglian) also sailed direct from England and arrived at the Dardanelles at the end of the first week in August. The 2nd Mounted Division of Yeomanry regiments and the 2nd Australian Division, which had been formed in Egypt, were waiting to embark for the Dardanelles as further reinforcements during the latter part of August.

The operations which commenced on 6th August were intended to secure the heights of Sari Bahr. Three attacks were planned to take place simultaneously; one, a containing attack by the VIIIth Corps, on the Helles front towards Krithia and Achi Baba, a second, by the Anzac Corps, to secure the Sari Bahr heights on its front, while the third was to be a surprise landing north of the Anzac front at Suvla Bay by divisions of the IXth Corps, to secure the heights east of the bay and join up with the Anzac Corps attack on Sari Bahr. For these operations the divisions were distributed as follows. On the Helles front, from right to left, were the French divisions, the 42nd and 29th Divisions, with the Royal Naval Division and 52nd Division in reserve. The Anzac front had been secretly reinforced during previous nights by the 13th Division, a brigade of the 10th Division and the 29th Indian Infantry Brigade. The 1st Australian Division was on the right, the New Zealand and Australian Division in the centre, and two brigades of the 13th Division and the 29th Indian Infantry Brigade on the left. The brigade of the 10th, and the third brigade of the 13th Division were in reserve. The landing at Suvla was to be effected by the 11th Division. The brigades of the 10th Division, one at Anzac, another at Mitylene, and the third partly at Mitylene and partly at Mudros, were widely apart, so that for the IXth Corps attack at Suvla only the 11th Division was available at the actual time of the landing.

The attack at Helles was met with an overwhelming fire and counter-attacks by the enemy, and, although it was continued during the following days, no material ground was gained, but its object in keeping enemy troops from reinforcing the Anzac front had been achieved.

On the Anzac front fighting of the most strenuous character took place over a confused hilly country without roads or

tracks, up ravines covered with thick scrub, and on to the precipitous ridges and peaks. One attempt after another was made to gain important positions on the ridges and high plateaux. Many of these were reached, but the enemy was in great strength, and the final objectives were not gained, although troops of the 29th Indian Infantry Brigade, on the 8th August, reached a neck on the Sari Bahr from which they looked down on the Dardanelles.

At Suvla the 11th Division landed on two beaches, one called C beach, south of the southern point of Suvla Bay, and the other, A beach, in the northern sector of the Bay. The 10th Division, less its brigade on the Anzac front, landed on the 7th August at two widely separated points, three battalions in the neighbourhood of a village, Ghazi Baba, about a mile

Salt Lake, Suvla.

east of Suvla point, the northern extremity of the Bay, and five battalions at B beach, between C beach and the Anzac beaches. The 11th Division landings were opposed by the enemy in positions at Lala Baba, a prominent hill near the southern extremity of the Bay commanding the C beach landing, and at "Hill 10" opposite A beach. Lala Baba was taken, but the advance across the plain inland ceased before the high ground was reached, owing to a variety of causes. The 10th Division, however, secured commanding positions along the Kizlar Dagh ridge between Suvla and Kiretch Tepe Sirt

Owing to the failure of the surprise attack on the Suvla front, attempts to continue the operations were temporarily abandoned and the IXth Corps, reinforced on the 8th August by the 53rd Division, was ordered to entrench on a line from a stream

Azmak Dere, which was the boundary between it and the Anzac area, through a knoll east of a hill known as Chocolate Hill, which had been secured, to the Kiretch Tepe Sirt. The

Chocolate Hill, Suvla front.

11th Division held the right, the 53rd the centre, and the 10th the left of this entrenched line.

On the 11th August the 54th Division landed at Suvla and joined the IXth Corps. On the 15th August Major-General

Kiretch Dagh and beach at Suvla.

de Lisle replaced Lieut.-General Sir F. Stopford in command of the corps. The 2nd Mounted Division, of some 4,000 dismounted yeomanry, from Egypt, and the 29th Division, from Helles. reinforced the IXth Corps on the Suvla front by the

20th August. Preparations were then made for a renewed attempt to gain the objectives. The 53rd and 54th Divisions were to hold the enemy on the line from a farm, Sulajik, about half way between the village of Anafarta Sagir and the centre of Suvla Bay, to the Kiretch Tepe Sirt, while south of Sulajik the 11th Division on the right and the 29th on the left were to endeavour to secure the hill, Ismail Oglu Tepe, and the ridge running thence to Anafarta Sagir, in co-operation with an attack undertaken by the Anzac Corps in order to effect a junction with the right of the IXth Corps. The 2nd Mounted Division and the two brigades of the 10th Division were to support the attack of the 11th and 29th Divisions.

The attack was launched on 21st August during misty weather, but fell into confusion owing to fog and fierce bush fires. The casualties were heavy. The Anzac Corps was, however, successful in reaching a position on the ridge Kaiajik Aghala, and northwards to Susak Kuyu on the lower ground towards Azmak Dere. It was ordered to renew its advance on the 27th August and secure Hill 60, just north of Kaiajik Aghala. After severe fighting from 5 p.m. on 27th to 1 a.m. on 29th August the hill was captured. This was the last engagement of any serious importance at or in the vicinity of Suvla during the occupation of the Peninsula.

The combined operations at Helles, Anzac and Suvla thus failed to attain their object ; and the question of withdrawal from the Gallipoli Peninsula was then considered. In the meantime it was decided to send a force to Macedonia to assist Serbia. The 10th and French Divisions were consequently withdrawn from Suvla and Helles in October and transferred to Salonika.

General Sir C. Monro was sent out to Gallipoli from France to report on the situation. He arrived at Mudros on 27th October, and took over command of the Mediterranean Expeditionary Force, which was now to consist of two armies, the Salonika Army, under Lieut.-General Sir Bryan Mahon, and the Dardanelles Army, under Lieut.-General Sir W. Birdwood. He fixed his headquarters at Mudros ; General Birdwood taking over the former G.H.Q. at Kephalos. Sir C. Monro advised the evacuation of the Peninsula, as the troops were decimated by battle casualties and disease. Lord Kitchener visited the Peninsula in the middle of November in order to enquire personally into the situation. A blizzard of exceptional severity raged between the 26th and 29th November and added some 16,000 more to the casualty list,

especially on the Suvla front, where the exposure was greatest and the trenches on the low ground specially liable to flooding. It was consequently decided, on the 7th December 1915, to withdraw from Suvla and Anzac, but to retain the Helles front.

The evacuation was successfully completed by the 19th December. On the 23rd December it was decided to withdraw also from Helles, and the last of the British troops left the Peninsula on 8th/9th January 1916. The casualties, which it was estimated would amount to 30 per cent. or 40 per cent. of the force during the withdrawal, were insignificant, practically no losses having been sustained during the evacuation from the three fronts.

At the time of the evacuation the 11th, 13th, 29th, 53rd and 2nd Mounted Divisions were on the Suvla front. The 13th and 29th Divisions were transferred to the Helles front and remained there till it too was evacuated. The Anzac front was held at the time by the 1st and 2nd Australian Divisions, the New Zealand and Australian Division, the 54th Division and the 29th Indian Infantry Brigade and Indian Mountain Artillery Brigade. The 54th Division was the first to be withdrawn. It left on 4th December, the whole of the Anzac Front being gradually evacuated before the final withdrawal from the Suvla front.

When the Helles front was evacuated, the 13th, 29th, 42nd, 52nd and R.N. Divisions were occupying it, the last three having been on this front continuously since landing.

On leaving the Peninsula the various formations went for a longer or shorter period to Imbros or Lemnos, and eventually to Egypt, where they formed the Egyptian Expeditionary Force or were transferred to the Western Front. The R.N. Division, however, remained at Mudros until the end of April 1916. It sent a brigade to Stavros on the Salonika Front in February 1916, and eventually was transferred direct to France, without returning to Egypt.

In this bare outline of the military operations no attempt has been made to detail the many intensely dramatic incidents during the various phases of the campaign, or the unparalleled difficulties with which all had to contend. These have been described in full and fitting language elsewhere.*

The campaign was of shorter duration than the campaigns in other major theatres of war, but it was characterized by

* The most illuminating descriptions are to be found in Sir Ian Hamilton's despatches, and in the works of Nevinson, Masefield and others.

an exceptionally large number of battle casualties and admissions to hospital for disease. As regards the medical services, it differed from other campaigns in the special difficulties encountered in, and measures required for, collecting and evacuating the sick and wounded, and in dealing with problems of sanitation. In fact it may be said that nowhere throughout the war had greater difficulties to be faced in providing for the care and comfort of the sick and wounded, and in maintaining the health of the troops.

The medical situation was still further complicated by administrative difficulties. The conditions under which the sick and wounded were being evacuated, more especially in the early phases of the campaign, gave rise to many complaints from all sides, so much so that when a commission under the "Special Commissions (Dardanelles and Mesopotamia) Act, 1916" was appointed in August 1916 for the purpose of enquiring into the conduct of the operations in the Dardanelles and Gallipoli, the terms of reference included an enquiry into the provision for the sick and wounded and the "responsibility of those departments of Government whose duty it has been to minister to the wants of the forces employed in that theatre of war." The Commission obtained evidence regarding the treatment of the wounded from a variety of sources, and after an exhaustive enquiry came to the conclusion that "until August 1915 the arrangements for dealing with the transport of wounded were in a very unsatisfactory state, and, indeed, the medical side of the campaign does not seem to have ever been thoroughly thought out. The treatment of the wounded ashore on the Peninsula appears to have been as satisfactory as circumstances would permit, but in the transport of men to the ships and overseas many of the complaints were justifiable."

The history of the medical services during the campaign is thus chiefly concerned with the vital problems of evacuation of the sick and wounded There were no routes of evacuation by road or rail from the immediate front, as in other theatres of war, and the part played by ambulance wagons, motor ambulance cars and convoys, ambulance trains and improvised ambulance trains elsewhere from front to base had to be taken by boats, launches and other small craft, and by hospital ships and transports improvised as ambulance carriers. It was in the arrangements for the employment of these various types of sea craft for the clearing of wounded from the battle front

that confusion arose, and an inevitable breakdown occurred.* The evacuation of wounded under such conditions was a new problem for the medical services. It formed no part of their training, nor was there anything in past experience or in Field Service Regulations to guide them. In fact the consideration of the organization and administration required for an overseas campaign, in which sea communications and disembarkation were liable to interference by the enemy, was omitted from the Field Service Regulations as they existed before the war. A campaign, in which enemy opposition to disembarkation was liable to occur, was regarded as a joint naval and military operation, with which, apparently, Field Service Regulations were not concerned.

The initial failure of the medical services, referred to in the Dardanelles Commission report was thus due to the difficulties with which not only the medical but all other administrative services had to contend, to previous lack of training in combined operations such as those at the landing on the Gallipoli Peninsula, and, more especially, to a miscalculation of the extent of the opposition and the failure to effect an immediate rapid advance inland.

Surg.-General Birrell, as already noted, had been appointed D.M.S. of the Force, but had been left behind at Alexandria with the rest of the administrative staff when Sir Ian Hamilton went to Mudros on 7th April. When he joined G.H.Q. with the other administrative services he was informed for the first time of the general arrangements. The number of probable casualties had been estimated at 3,000, but Surg.-General Birrell considered this a serious underestimate and required provision to be made for 10,000. Consequently the following memorandum was submitted by the Deputy Adjutant-General, Major-General E. M. Woodward, to the Chief of the General Staff on the 18th April :—

" The medical arrangements in connection with the landing of the British Force are at present as follows :—

1. With each covering Force the bearer sub-divisions of a field ambulance and one tent sub-division, with as much medical and surgical material as can be man-handled by the personnel ; giving a total of 150 medical personnel with each covering Force.

* The difficulties inherent in a landing under fire on a hostile shore adequately defended by a brave enemy, an operation never before attempted under modern conditions of warfare, accounted, to a great extent at any rate, for the confusion. The important thing was to minimize as far as possible the inevitable confusion that occurs when operations are of an amphibious nature. The first landing was made with inadequate medical resources, but was one of the finest feats of arms the British Army has ever performed.

2. At 2 p.m. on the day of landing the personnel of the casualty clearing stations (one for the 29th Division, one for the Australian and New Zealand Army Corps) will be landed with as much medical and surgical material as can be man-handled.

3. When the remainder of the division lands the rest of the field ambulances and the equipment of the casualty clearing stations will be put on shore as soon as they can be disembarked.

4. Two hospital ships will be available :—

with the 29th Division	..	" Sicilia "
accommodation	.. ..	400 serious cases
with the A. and N.Z.A.C.	..	" Gascon "
accommodation	.. ..	300 serious cases

(the latter ship is expected here on Tuesday).

5. I understand from the Senior Naval Transport officer that the Navy will commence the transport of wounded from the shore to the ships about 2 p.m. The means of evacuation are as follows :—

Three launches, each capable of holding twelve cots are available for the 29th Division and the same number for the Australian and New Zealand Army Corps. These launches are to be towed to the Hospital ships and other ships in which the men are to be accommodated.

This provision for the evacuation of casualties from the Force appears to be altogether inadequate and I would strongly urge that the following proposals should be sanctioned :—

(1) B.2. " Caledonia " .. .. 400 serious cases
B.7. " Aragon " .. .. 400 ,, ,,
B.9. " Dongola " .. .. 200 ,, ,,
should be allotted to the 29th Division for the accommodation of their wounded.

I recommend :—

(2) That the A.25. " Lutzow " .. 200 serious cases
A. 1. " Ionian " .. 100 ,, ,,
Some other ship (" Southland "?) 420 ,, ,,
be allotted to the Australian and New Zealand Army Corps.

(3) That two more tows of three launches each—equals 72 additional cots—should be provided for the 29th Division, and a similar number for the Australian and New Zealand Army Corps.

6. It has previously been proposed to provide the personnel and medical and surgical equipment for the above transports of the 29th Division from Nos. 15 and 16 Stationary Hospitals, and the personnel for the transports of the Australian and New Zealand Army Corps from No. 2 Australian Stationary Hospital. These stationary hospitals have been wired for."

The Deputy Adjutant-General also spoke on the subject of the memorandum and gathered that the views of the General Staff were to the effect that wounded must be accommodated and attended to on shore in the best way possible ; that it was out of the question to attempt evacuating wounded men from the shore to ships while fighting was in progress close to the landing places ; but that it might be possible to attempt something at night, although it was doubtful if it would be possible to evacuate any wounded for two or three days. The arrangements made for bringing up No. 16 Stationary Hospital, and No. 2 Australian and New Zealand Army Corps Stationary

Hospital from Alexandria, and the proposal to earmark additional ships besides the two hospital ships for taking the wounded to Alexandria as soon as the enemy had been driven back were approved.

On the same day the D.A.G. submitted the following memorandum to the Q.M.G. :—

" The position as regards Hospital Ships is as follows :—

" Sicilia " .. accommodation 400 serious cases .. Mudros
" Gascon " .. accommodation 300 serious cases .. due on Tuesday.

In the event of serious fighting those two ships will not provide sufficient accommodation for evacuating wounded men from the shore.

It is proposed in the case of the 29th Division to utilize the following ships :—

Troops Accommodated.

Officers.		Other ranks.		
100	..	2,000	..	B.2. " Caledonia "
230	..	1,800	..	B.7. " Aragon "
140	..	1,600	..	B.9. " Dongola "
				B. " Southland "

" For the Australian and New Zealand Corps :—

Troops accommodated.

Officers.		Other ranks.		
200	..	1,200	..	A.3. " Devanali "
135	..	1,790	..	A.25. " Lutzow "
90	..	2,000	..	A.1. " Ionian "
220	..	—	..	A.10. " Derflinger "
34	..	1,050	..	A.29. " Sewing Bee "

It is proposed to provide personnel and medical and surgical equipment for the above ships from Nos. 15 and 16 Stationary Hospitals and No. 2 Australian Stationary Hospital, and to evacuate direct to Alexandria.

The ships when loaded with wounded could remain off the shore for 48 hours, so as to be available for re-embarking troops if necessary. But the ships could not be kept waiting more than 48 hours.

Have you any objection to the above arrangements being carried out ? If not I propose to take steps at once to ascertain the number of wounded cases that could be accommodated on each of the above mentioned ships.

The matter is one of great urgency as without some such arrangement it will be impossible, from a medical point of view, to commence serious operations."

Both the C.G.S. and Q.M.G. concurred in these proposals on the 18th April, and on the 24th April Surg.-General Birrell submitted to the Adjutant-General, Quartermaster-General and the General Staff the following statement of the medical arrangements in connection with the landing of the Mediterranean Expeditionary Force :—

" 1. With each covering Force the bearer sub-division of a field ambulance and one tent sub-division with as much medical and surgical material as can be man-handled by the personnel, giving a total of 150 medical personnel with each covering Force.

" 2. At 2 p.m. on day of landing the personnel of the casualty clearing stations (one for the 29th Division and one for the Australian and New Zealand Army Corps) will be landed with as much surgical and medical material as can be man-handled.

"3. When the remainder of the Division lands the rest of the field ambulances and the equipment of the casualty clearing stations will be put on shore as soon as they can be disembarked.

"4. Two hospital ships will be available:—

With the 29th Division ..	"Sicilia"
accommodation	400 serious cases.
With the A. and N.Z.A.C.	"Gascon"
accommodation	500 serious cases.

"5. I understand from the Senior Naval Transport officer that the Navy will commence the transport of wounded from the shore to the ships about 2 p.m.

The means of evacuation are as follows:—

Three launches, each capable of holding twelve cots, are available for the 29th Division and the same number for the A. and N.Z. Army Corps.

These launches are to be towed to the hospital ships and other ships in which the men are to be accommodated.

The following transports are allotted to the 29th Division for acommodation of casualties:—

(a) B.2. "Caledonia" ..	400 serious cases	..	1200–1500 slight.
B.7. "Aragon" ..	400 ,, ,,	..	1200–1500 ,,
B.9. "Dongola" ..	400 ,, ,,	..	1200–1500 ,,

(b) Allotted to the A. and N.Z. Army Corps:—

A.25. "Lutzow"	200 serious cases	..	1000 slight
A.1. "Ionian"	100 ,, ,,	..	1000 ,,
A.15. "Clan McGillivray" ..	100 ,, ,,	..	600 ,,
A.31. "Seang Chung" ..	100 ,, ,,	..	600 ,,

Medical personnel and medical and surgical equipment for the "Caledonia," "Aragon" and "Dongola" have been provided by No. 15 Stationary Hospital, and for the "Clan McGillivray" and "Seang Chung" by the A. and N.Z. Field Ambulance, at present, and later by No. 2 Australian Stationary Hospital.

The "Lutzow" and "Ionian" to be supplied later with medical and surgical equipment by No. 2 Australian Stationary Hospital.

The personnel of No. 16 Stationary Hospital kept in reserve.

"6. No. 4 Advanced Depôt in "Anglo-Egyptian" is placed at disposal of A. and N.Z. Army Corps, and No. 5 Advanced Depôt Medical Stores at disposal of 29th Division.

"7. It is proposed to evacuate ships with casualties direct to Alexandria and Malta.

"8. No. 1 Australian Stationary Hospital at Mudros to be used for sick from shipping at Lemnos."

No. 1 Australian Stationary Hospital at Mudros, the only hospital unit established nearer than Alexandria, was already full of sick from the various transports in Mudros Bay, several being cases of infectious disease. Consequently, a telegram was sent to the base to send up a hospital ship, "Guildford Castle," which was then at Alexandria, to clear the stationary hospital. It sailed for Mudros on 21st April. Two other hospital ships, the "Sudan" and "Delta," came up from Egypt. A hospital ship, "Somali," was also in the Ægean for the naval sick and wounded.

The total accommodation on the three hospital ships, "Gascon," "Sicilia" and "Somali," was for 1,995 seriously

wounded, but 414 more could be taken on board in an emergency. The total capacity of the seven transports selected was for 7,300 slightly wounded, so that provision had then practically been made for the estimated number of casualties.

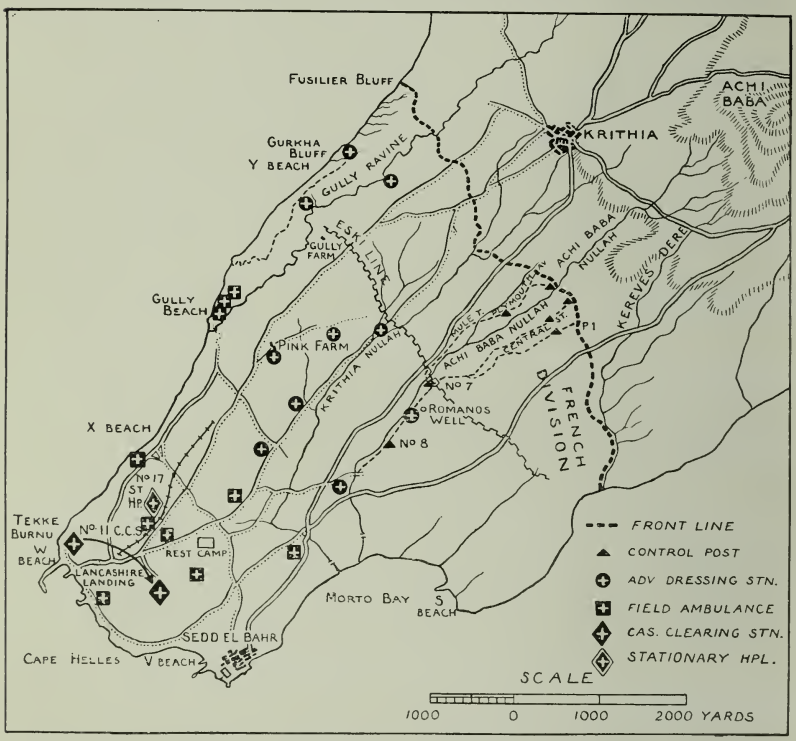
The whole of the medical arrangements was based on the assumption that a considerable advance inland would immediately follow the landing of the covering Force; and it was intended to land the three stationary hospitals, Nos. 15, 16 and 2 Australian, at once and establish them on shore. Until this could be done seriously wounded in excess of those for whom accommodation was provided on the hospital ships were to be sent to the transports and taken care of by the detachments of the stationary hospitals on each. But as it was intended to land the hospitals immediately, the necessity of using the transports for serious cases was not considered probable and they were consequently not equipped for the reception of such cases. This seems an unfortunate oversight, for, if there was any intention whatever for dealing with serious cases on board them at any time, equipment for the purpose should have been provided.

Four medical officers were placed on each of the three transports allotted to receive wounded from the 29th Division; but those allotted to the Anzac Corps sailed for the beaches without the officers or staff of No. 2 Australian Stationary Hospital. The "Hindu," on which the hospital had embarked at Alexandria, was delayed, and did not reach Mudros Harbour until the transports were about to sail. No boats to carry out the transhipment could be obtained. Fifteen rank and file, however, managed to get on board the "Seang Chung." The "Hindu" also brought No. 16 Stationary Hospital, and an advanced depôt of medical stores, No. 5, for the Helles front. No. 4 Advanced Depôt for the Anzac front was on another transport, "Hymettus," which, however, ran ashore at the time of sailing from Egypt and did not reach the Peninsula in time for the landing.

The 29th Division had its full complement of medical officers with battalions. Its field ambulances were Nos. 87, 88 and 89, all of which were Territorial Force units, namely, 1/1st West Lancashire, the 1/1st East Anglian, and the 1/1st Highland Field Ambulances. The Anzac Corps was also complete as regards its medical services. With the 1st Australian Division there were Nos. 1, 2 and 3 Australian Field Ambulances, and with the New Zealand and Anzac Division Nos. 4 and 5 Australian Field Ambulances and the New Zealand Field

Ambulance. The medical units of the R.N. Division were Nos. 1, 2 and 3 R.N. Field Ambulances. No. 11 C.C.S. was embarked to land with the 29th Division, and No. 1 Australian C.C.S. with the Anzac Corps.

No D.D.M.S. had been appointed to the Anzac Corps, but each division was accompanied by its A.D.M.S., Colonel M. T. Yarr, R.A.M.C., with the 29th, Fleet-Surgeon Gaskell, R.N.,



SKETCH MAP SHOWING THE BRITISH MEDICAL POSITIONS AT HELLES

with the R.N. Division, Colonel Howse, A.A.M.C. with the 1st Australian, and Colonel N. Manders, R.A.M.C., with the New Zealand and Australian Division. Each had with them a D.A.D.M.S.

The bearer divisions and only a proportion of the tent divisions of the field ambulances were detailed to land with the covering forces. The tent divisions were to remain on the transports to land later. No ambulance transport* was

* Motor ambulance cars of field ambulances had been left in Eygpt and were being used by the D.M.S. there.

to land either with them or with the two casualty clearing stations, but each man was to carry 1 cwt. of equipment on shore with him, or as much as could be man-handled.

The landings were effected as planned. On the Helles front detachments of the field ambulances of the 29th Division landed as follows :—

No. 87 F.A.	Bearer Division at X beach ; " B " Section Tent Sub-division at Y beach.
No. 88 F.A.	Both Bearer and Tent Divisions at S beach.
No. 89 F.A.	Bearer Division at V beach ; " B " Section Tent Sub-division at W beach.

Cape Helles: view from Lancashire Landing. On cliff-top are tents of No. 11 C.C.S.

" A " and " C " Sections Tent Sub-divisions of No. 87 and of No. 89 Field Ambulances did not land. They remained respectively on the transports " Southland " and " Marquette," cut off from communication with the shore. On the withdrawal of the battalions from Y beach, " B " Section Tent Sub-division of No. 87 was taken on board H.M.S. " Goliath " on the 26th April, and transhipped to a transport " Ansonia." It joined the bearer division at X beach on the 28th April. The bearer division of No. 89 Field Ambulance at V beach took possession of a collier, " River Clyde," which had been beached at the landing, and brought wounded to the holds, where they were kept under cover until they could be cleared.

No 11. C.C.S. landed early in the afternoon of the 25th April at W beach, and opened on the cliff at the north end of the beach. The A.D.M.S. of the 29th Division also went on shore at W beach that afternoon.

On the Anzac front, the A.D.M.S. of the 1st Australian Division went on shore in the early morning. The field ambulances landed as follows :—

No. 3 Australian Field Ambulance Bearer Division at 4.30 a.m. on the north end of Anzac Cove.

The casualty clearing station at Anzac, looking towards Suvla.

No. 2 Australian Field Ambulance Bearer Division at 7 a.m. on the beach south of No. 3 Australian Ambulance.

No. 1 Australian Field Ambulance Bearer Division at 9.30 a.m. also at north point of the beach.

The tent divisions did not land—that of No. 1 was on the transport " City of Benares," of No. 2 on the " Mashobia," " A " and " B " sub-divisions of No. 3 on the " Nizam," and " C " sub-division on the " Suffolk."

No. 1 Australian C.C.S. landed at 10 a.m. on the 25th April, and went to a narrow strip of beach where a portion of the cliff had been previously cut away for it at the south end of the landing. The site was extremely cramped and did not afford room for expansion.

The exact details of the field ambulances of the New Zealand and Australian Division are wanting. Apparently they were denuded of personnel to take charge of wounded on the transports allotted for the purpose to the Anzac Corps. The only detail noted is that the bearer division of No. 4 Australian Field Ambulance did not land till the 27th April, and its tent division the following day, less some of the personnel retained on the transports.

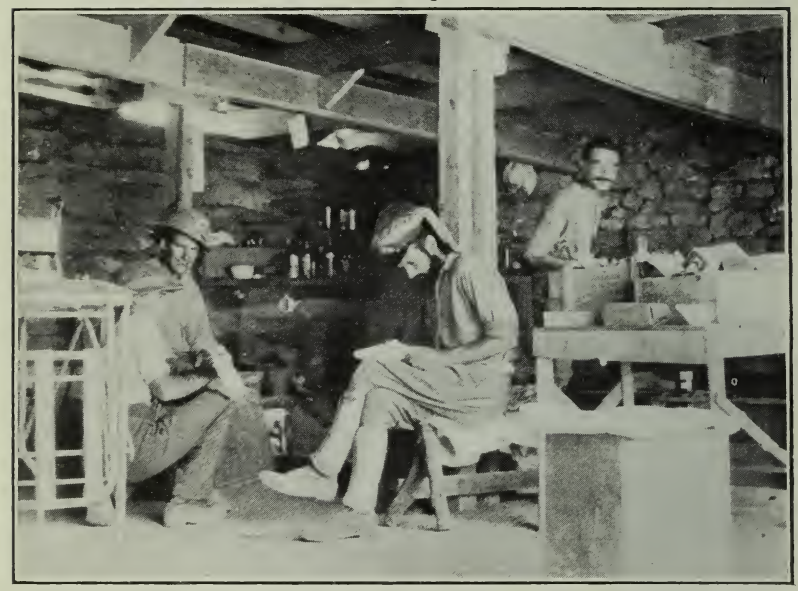
The field ambulances of the R.N. Division did not land at first. No. 2 R.N. Field Ambulance was employed in staffing

No. 4 Australian Field Ambulance, Anzac, May 1915.

transports carrying wounded. No. 1 landed at Anzac on the 28th April with the battalions of the division sent there. The bearer division of No. 3 R.N. Field Ambulance landed on 29th April with the battalions sent to Helles. Its tent division assisted in staffing the " Somali " hospital ship and went with it to Malta. The headquarters of the division, with the A.D.M.S., were on the Anzac front at first, but were transferred on 5th May to the Helles front and landed at W beach.

At the time of the landing and during the critical period which followed there was thus only a proportion of the field

medical units and the two casualty clearing stations with the divisions on shore. They were exposed to constant rifle and artillery fire, especially at the beaches to which they had to bring the wounded for embarkation on the boats. The regimental medical services and bearer divisions of the field ambulances worked heroically throughout under conditions of exceptional difficulty and danger, inspired as they must have been by the conspicuous courage and desperate determination of the fighting ranks in their hand to hand struggle with the enemy. Regimental aid posts were formed wherever any kind



Interior of a dressing station of the Royal Naval Division, Helles front.

of protection could be obtained in gullies or elsewhere. This was possible to some extent on the Anzac front, but the beaches and higher ground beyond on the Helles front were exposed to fire from nearly every direction except the west. The only protection that could be found at first was under the cliffs on the beaches, but on V beach these were low, and afforded but poor protection, and everywhere the space was cramped.

There were thus neither means nor room for retaining the casualties for treatment on shore, or even until they could be sorted out for embarkation on hospital ships and transports, as had originally been intended. It was imperative to clear

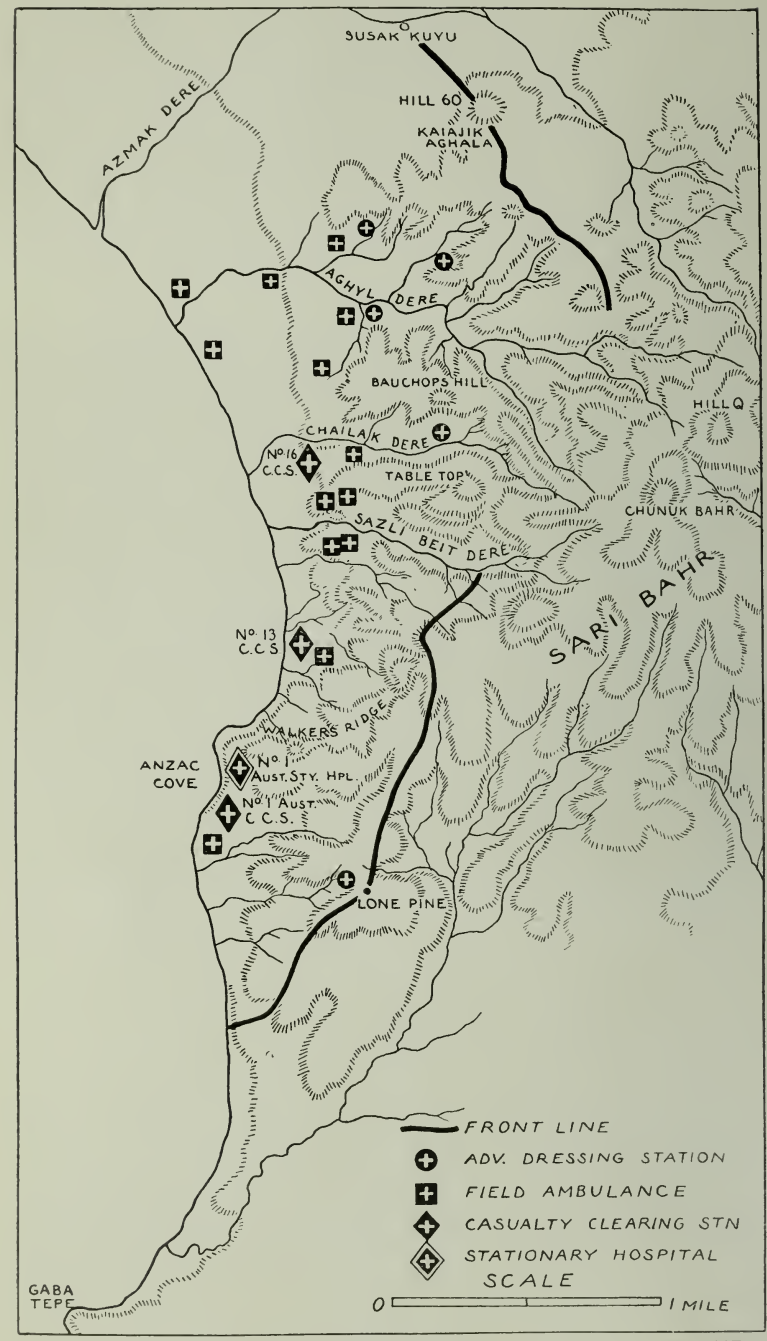
them from the beaches as rapidly as possible. Unfortunately the arrangements for doing so broke down, and the utmost confusion prevailed. There was no guiding or directing hand. The D.M.S. was on the "Arcadian," but the use of the wireless for obtaining information of what was happening was denied him. Very many of the landing parties had been killed or wounded in the boats and lighters before reaching the shore. They were brought back to the ships, from which they landed, on the returning boats. Transports were thus filled with wounded, for whose reception they were neither staffed nor equipped. The ships were soon crowded with wounded, and the boats in some instances had to go from one transport or hospital ship to another before finding room for their loads. Classifying the casualties into seriously and slightly wounded according to the scheme became impossible before they were embarked on the boats. Seriously wounded were embarked on transports and slightly wounded on hospital ships. The "Gascon" hospital ship, for example, had received 300 slightly wounded on the first day, and was consequently more than half full with that class of case and unable to take its proper load of seriously wounded.

The conditions were worst at the Anzac landings owing to want of small craft and of organization for loading the ships. The responsibility for this, however, did not rest with the medical authorities.

The "Gascon" and the "Sicilia" were the only hospital ships present at the time of landing. The "Somali" and "Sudan" came up immediately afterwards, the "Guildford Castle" on the 26th, and the "Delta" on the 27th April.

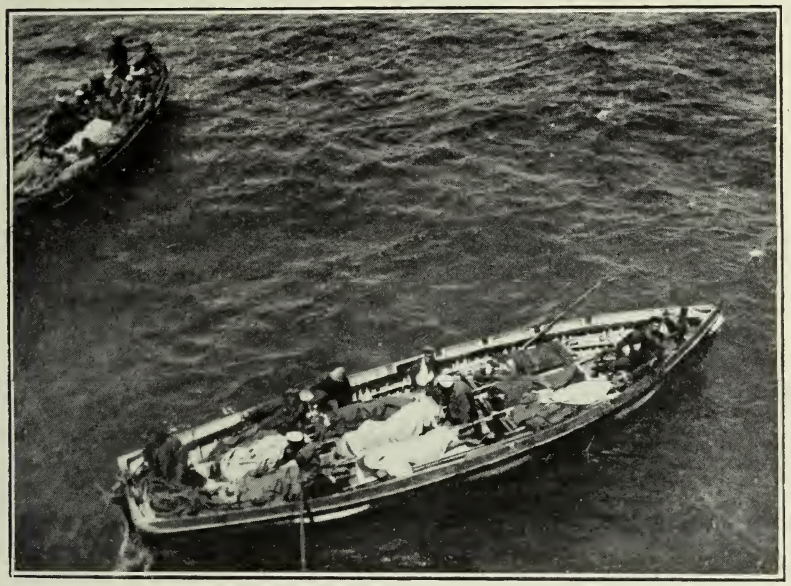
There were no arrangements at Mudros for landing or sorting out the wounded before evacuating them to the base in Egypt. Consequently, the transports filled with wounded sailed to Alexandria direct from off the beaches. Some of them had horses on board, which it was impossible to land, and wounded had to be brought to Alexandria with the horses, thus adding to the unsatisfactory conditions which prevailed.*

* The Dardanelles Expedition had in many respects its parallel in the Expedition sent by France to land at Algiers in 1830. Full provision had been made for the medical services. A hospital with 2,000 beds was established at Port Mahon on the island of Minorca, after negotiations with the Spanish Government, to which sick and wounded could be evacuated from the field hospitals with the expedition, each of which was organized for 150 beds. The process of landing on the hostile shore was rehearsed beforehand at Toulon. The parallel is interesting as Port Mahon in a way bore the same relationship to Algiers as Mudros did to the Dardanelles; the chief difference being that Mudros was not provided with hospital accommodation until long after the landing was effected.



SKETCH MAP SHOWING THE MEDICAL POSITIONS AT ANZAC

For this state of affairs and the confusion that occurred in the distribution of casualties to hospital ships and transports it would scarcely be fair to blame the medical services of the Expeditionary Force. It arose from a variety of causes over which they had little or no control, and chiefly because the preparations had been made on the assumption that the covering force would advance inland and that the medical units could land and retain the wounded on shore for two or three days until they were classified for embarkation on hospital ships or transports prepared to receive them according to the severity



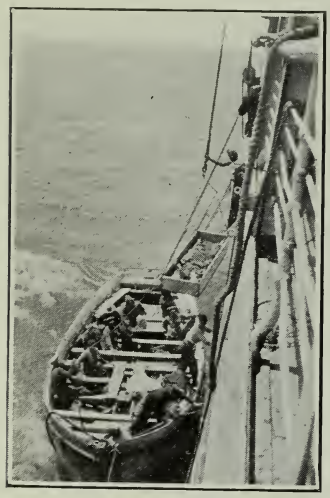
Wounded being brought from Anzac Cove to a hospital ship.

or otherwise of the wound. The best that could be said was that the tent divisions of many of the field ambulances and three stationary hospitals were still on board some of the transports and at once took charge of the wounded, who were unexpectedly embarked on them.

The records of the numbers of casualties at the landing are incomplete, but the number of wounded between the 25th and 30th April has been estimated at 259 officers and 6,334 other ranks. The 29th Division suffered most, approximately 110 officers and 2,738 other ranks being wounded. The two divisions of the Anzac Corps had a total of 136 officers and

3,313 other ranks wounded. The proportion of killed to wounded was approximately 1 to 3. A comparatively large number of the wounds were bayonet wounds.* Some conception of the fierce character of the fighting in these earlier days may also be gathered from the losses amongst General d'Amade's French troops. In the Final Report of the Dardanelles Commission it is stated that their casualties in killed and wounded, between the 25th April and 12th May 1915, amounted to 246 officers and 12,364 other ranks, out of a total strength of 334 officers and 22,116 other ranks.

After the first few days the conditions affecting the evacuation of the sick and wounded gradually improved. An advance of about two miles inland had been made on the Helles front, there was more space for systematic work, and the casualties in point of time were fewer. More transports were taken up, staffed and equipped as "ambulance carriers," and two or more hospital ships were continuously anchored off the Peninsula for the reception of serious cases. When they were filled they were replaced by others. The "ambulance carriers," or improvised hospital ships, were fairly satisfactory for bringing the slighter cases or even comparatively serious cases to Alexandria. Four to eight medical officers, according to the size of the transport, were placed on board, and eventually some twenty transports were permanently staffed and equipped and constantly employed as "ambulance carriers."



Loading wounded on hospital ship off Anzac.

The personnel and equipment of the four stationary hospitals, Nos. 1 and 2 Australian, and Nos. 15 and 16 British, as well as the tent divisions of field ambulances, were employed on these transports during the first month.

After the "Hindu" with No. 2 Australian and No. 16 Stationary Hospitals on board arrived at Mudros, it lay off the entrance to the Dardanelles from the 25th to 29th April,

* Bayonet wounds were rarely seen in the medical units in other theatres of war.

and was then moved to an anchorage off "Anzac." The stationary hospitals remained on board but sent detachments to other transports and hospital ships. No. 15 Stationary Hospital and No. 1 Australian Stationary Hospital were similarly employed. The latter, however, had remained on shore at Mudros until the 12th May, and was only employed in the transports for about a week subsequently, as it landed again at Mudros on 18th May. In addition to the stationary hospitals, a detachment of No. 1 Australian C.C.S., which had landed at Anzac on the 25th April, remained on the transport in charge of wounded and continued to staff one transport after another during voyages to Alexandria until the 31st May, when it rejoined the unit on shore.

Early in May one of the transports, the "Alaunia," on which wounded had been embarked, was converted into a stationary hospital at sea, and anchored off Helles. No. 16 Stationary Hospital was transhipped to it from the "Hindu" and organized a hospital on board with sections for seriously wounded, seriously sick, infectious cases, and slightly sick and wounded. As many as 27 officers, 910 other ranks, and 37 wounded enemy patients were under treatment on board by the 5th May. The more serious cases were transferred from time to time to the hospital ships, other cases remained under treatment till they recovered and were discharged to duty. No. 1 Australian Stationary Hospital and a detachment from No. 15 Stationary Hospital were added to the staff of the "Alaunia" on the 14th May. No. 5 Advanced Depôt of Medical Stores was also transferred to it and issued stores to the medical units on shore. The "Alaunia" continued to function in this manner as a floating hospital off the beaches until the 17th May, when it was brought back to Mudros, and landed the stationary hospitals for work on shore. No. 5 Advanced Depôt of Medical Stores was landed at the same time, but a few days later was re-embarked and brought to Helles, where it was established on shore on the 25th May. No. 2 Australian Stationary Hospital acted in a somewhat similar capacity, but was more split up and employed on several transports. Half of the unit was on the "Seang Chung," and remained anchored off Anzac from the 11th to 18th May, and afterwards in Mudros Harbour till the 25th May, with 454 patients on board. The wounded were cleared from the "Seang Chung" then, and the medical staff on board was transferred to another transport, "Franconia," to which the remaining half of No. 2 Australian Stationary Hospital had

been transferred at Alexandria from another transport, "Gloucester Castle," with which it had come to Egypt with wounded from the beaches. No. 2 Australian Stationary Hospital continued to treat wounded on board the "Franconia" until the 4th June, when the whole of the unit was landed at Mudros and opened alongside No. 1 Australian Stationary Hospital.

The medical situation during the first month after the landing remained very much as described above, that is to say, transports staffed by personnel of stationary hospitals were employed as supplementary to the hospital ships for bringing wounded and sick to Egypt. The hospital ships as a rule took wounded either to Egypt or Malta, or to the United Kingdom. But occasionally transports arriving at Alexandria had to carry their loads of wounded to Malta, owing to the hospitals in Egypt being full. All this gave rise to unfavourable comments and complaints from various sources. The D.M.S. in Egypt, in a letter to Surg.-General Birrell dated 17th May 1915, refers to these complaints, but stated that the wounded had arrived in the transports in Egypt well-dressed. Sir J. Maxwell, the Commander-in-Chief in Egypt, at the same time sent the following telegram to Lord Kitchener in reply to the complaints sent to him from the War Office :—

"Please state source of representations, which I believe to be unfounded. It was impossible to deal with the rush of wounded in fitted hospital ships, which were well supplied with everything. Therefore ordinary transports had to be used. The best possible surgical arrangements were made under most difficult circumstances. Of course transports could not be cleaned as troops had to disembark and wounded embark on the same day. Over 11,000 cases have been brought from Dardanelles, all with wounds dressed. All these, except 2,000 sent to Malta since, comfortable in hospital and attended to within 80 hours of being wounded."

Whatever fault there was lay in the neglect to make medical provision for a reverse at the landings. To meet such a contingency with any degree of adequacy the D.M.S. would require motor or steam launches to enable him to move rapidly by sea from place to place, and the medical services a large fleet of hospital ships, boats and lighters under their own control. Such provision, however, would probably not have been granted at the time, even had it been demanded.

But it would have been feasible to establish hospitals with a large amount of accommodation on the island of Lemnos, and if this had been done in anticipation of the landing on the Peninsula much of the trouble would have been avoided. The wounded could then have been received there in the first instance and proper arrangements made for their further

evacuation to Egypt, Malta or England. Unfortunately no hospital arrangements had been made on shore at Mudros, nor any medical administration established there until towards the end of May.

In order to establish some kind of medical control over the beaches Surg.-General Birrell had Colonel Maher and his staff brought from Alexandria to the Peninsula. They arrived at Mudros on 5th May. Lieut.-Colonel Thom was sent to the Anzac front to act as A.D.M.S. of the beaches there, while Colonel Maher and Lieut.-Colonel Dorgan landed at Helles on W beach. On the 24th May Colonel Maher was ordered to proceed to Mudros, leaving his two A.Ds.M.S. at Anzac and Helles.

The stationary hospitals which had been doing duty on transports, were then being established on shore in the vicinity of Mudros, on the east side of the harbour. Colonel Maher assumed general administrative control of these, and joined the staff of the I.G.C. on the "Aragon," but he had then no staff with him except a staff-serjeant R.A.M.C., until Lieut.-Colonel Thom returned from the Peninsula on the 2nd July.

Surg.-General Birrell's arrangements at this time were to keep the slighter cases of sickness or wounds in the field ambulances on shore if they were likely to recover in from three to seven days. Others likely to recover within two or three weeks were sent to the hospitals at Mudros, where efforts were being made to have accommodation for 3,000 and to expand to 6,000. All other cases were sent to Egypt or Malta as rapidly as possible. The return journey of the ships to Alexandria and back took over seven days, to Malta and back ten to twelve days. The ships sailed whenever they were full, and not according to any fixed time table. The essential requirement was rapid and immediate clearing of sick and wounded to the bases.

When, owing to the activities of the enemy submarines, it was no longer possible to keep the transports anchored off the beaches, a system was established of bringing the sick and wounded on trawlers and mine sweepers to Mudros and transhipping them to the transports there. The mine sweepers were steamers of the cross-channel type, with good saloon and cabin accommodation. They could carry 150 patients each, half of them lying down. Two medical officers and seven to twenty orderlies, with a sufficient supply of medical and surgical stores and comforts, were placed on board each mine sweeper

allotted for the medical services. In quiet times 150 sick or wounded could be cleared daily in this way from Helles and 300 from the Anzac front.

The hospital ships were under the protection of the Geneva Convention and remained off the beaches, receiving the more serious cases direct from the shore.

Between the 25th and 29th May three more casualty clearing stations, Nos. 24, 25 and 26, arrived at Mudros from England. They were employed for a time in staffing the mine sweepers and for temporary duty on shore on the Peninsula, but all three were landed at Mudros between the 20th and 22nd June. No. 24 C.C.S. formed a large convalescent depôt there till the end of the campaign. No. 25 was sent to Kephalos, on the island of Imbros, and remained there till it left for Salonika at the beginning of October. No. 26 opened as a convalescent depôt at Mudros until it was transferred to Suvla Bay with the 10th Division in August.

A base depôt of medical stores, No. 5, was established at Mudros at the same time, so that at the end of the second month after the landing Mudros was becoming an important hospital centre. Its bay was also full of transports receiving wounded from the beaches, and taking them to Alexandria.

The arrangements for the collection and evacuation of the sick and wounded were thus beginning to assume a more satisfactory shape. But the sites of the hospitals at East Mudros were unsatisfactory, and the accommodation in them inadequate. Suitable landing places were lacking, and water supply was always a difficulty. The result of want of adequate accommodation was that the sick and wounded brought to Mudros had frequently to be transhipped direct to transports in the bay, and the transports sailed before the patients had been properly sorted out and classified. Hospital ships had also at times to unload their patients at Mudros in order to return at once to the beaches, and when there were no vacant beds for them on shore, patients on board were transferred to the transports.

This unsatisfactory state of affairs was still further accentuated by the difficulties with which the D.D.M.S., Mudros, had to contend. His office was on the "Aragon," but sometimes he had no launch at his disposal to enable him to visit transports, and satisfy himself that they were properly prepared and staffed for the conveyance of patients. Proper supervision in the circumstances was impossible, and instances of insufficiency of personnel and equipment on some of the transports continued to occur.

The hospitals in Egypt and Malta became filled to overflowing, and urgent demands were made on the War Office to send hospital ships to keep them cleared for the sick and wounded from the Dardanelles. All this reacted on public opinion in the United Kingdom and Australia, and led the D.G.A.M.S. to ask for Surg.-General Babtie to be brought from India to act as a Principal Director of Medical Services in the Mediterranean. He arrived in Egypt in the middle of June, his duties being defined as those of Command of the Medical Services in Malta, Egypt and the Mediterranean Expeditionary Force, with instructions to co-ordinate them, arrange for the reception of sick and wounded from the Dardanelles and advise on questions of sanitation. At the time of his arrival in Egypt to take up the appointment five hospital ships were being employed on service between Egypt and England, and two on the Dardanelles service. For the latter service two more were being fitted out in Egypt and two in England. Surg.-General Babtie asked for an increase in the number of hospital ships on the Dardanelles service to twelve, in order to allow of four for British and two for Indian sick and wounded being always off the beaches while the others were on their way to Egypt, Malta or England. He devised a scheme by which a hospital ship, whether full or not, sailed weekly for these bases with serious cases according to a time table. The less serious were to continue to be taken on transports to Alexandria. He estimated that in this way 12,700 could be cleared monthly from the Dardanelles, of whom 1,500 would go to England in hospital ships direct, and 10,000 British and 1,200 Indians to Egypt or Malta.

The scheme looked well on paper, but Surg.-General Birrell expressed grave misgivings as to the manner in which it would work. It radically altered the arrangements which he had made and which were functioning well. It was not sufficiently elastic to deal with large numbers in excess of 12,000 monthly. This number was an underestimate of requirements and was likely to increase. Further, any scheduled scheme of sailing was apt to be interfered with by weather, and it was essential to avoid delay in clearing the wounded to the bases whenever the ships were full, independent of any fixed time table. The scheme, too, did not take into account the clearing of the hospitals in Egypt and Malta, where the inflow was greater than the outflow.

Surg.-General Babtie, when he assumed control over the medical services in the Mediterranean, formed a large

reserve of personnel and equipment for staffing and fitting out transports employed as ambulance carriers. He kept an establishment at the Base of 200 medical officers and 200 nursing sisters for this purpose, but the D.M.S. of the Expeditionary Force was called upon to make up any shortage in other ranks from the tent divisions of field ambulances, which were at the time mainly employed in attending to the sick and wounded on the mine sweepers during the journey from the beaches to Mudros. Four to six medical officers and a proportionate number of other ranks and nursing sisters were placed on board each transport, with a large supply of hospital clothing, cots, stretchers and mattresses. Provision was also made for a new pattern of hospital marquee for the use of the hospitals that were being established at Mudros. Several of the transports, or "black ships" as they were called, originally used for carrying wounded, were converted into hospital ships at Alexandria or in England. At one time as many as 26 were employed on the ferry service from the Dardanelles to Alexandria, and a similar number for clearing sick and wounded from Egypt and Malta to the United Kingdom. Arrangements were also made for taking up a large number of transports as " ambulance carriers " in emergencies.

When it was evident that the hospital transport arrangements were insufficient, the Quartermaster-General held a conference in London with representatives of the Admiralty, at the latter's request, on the 15th June, the Director-Generals of the Royal Navy and Army Medical Service being present. The Admiralty representatives considered that by some adjustment and co-ordination better results could be obtained and greater use made of the available accommodation on the hospital ships and " ambulance carriers." It was agreed that the right course to pursue would be to keep a regular service of ships for severely wounded cases to work between the Dardanelles and the United Kingdom, and to have a ferry service of " carriers " for the more lightly wounded to work between the Dardanelles and Alexandria or Malta.

A scheme was accordingly drawn up and Surg.-General Sir James Porter, formerly a Director-General of the Medical Services of the Royal Navy, was appointed by the Admiralty as Hospital Transport Officer in the Mediterranean, with the concurrence of the Director-General of the Army Medical Service. This new appointment was communicated to the Commanders-in-Chief in Malta, Egypt and the Mediterranean Expeditionary Force by telegram on the 21st

June. It was not received favourably. It was obvious that it would involve a dual control of the evacuation of the sick and wounded, and consequent confusion. In fact there was already some confusion of this character between the duties of the D.M.S. of the Mediterranean Expeditionary Force and the P.D.M.S. of the Mediterranean with regard, at any rate, to evacuation from the beaches to Alexandria. The appointment of an additional controlling and co-ordinating administrative medical officer was not therefore likely to be of much assistance. Sir Ian Hamilton protested against it. Surg.-General Babtie considered it unnecessary. Sir James Porter, however, arrived at Mudros, and assumed responsibility for directing the movements of all sick and wounded of both services by sea at the end of July. His responsibility was defined as commencing at high-water mark. His headquarters were on a yacht, "Liberty," which was nominally at Mudros, but could move from place to place. He determined when and to what places hospital ships and ambulance carriers should go, and in fact carried out the duties of the Q.M.G.'s branch of the Staff at G.H.Q., although independent of the military command. His scheme of evacuation differed from Surg.-General Birrell's and Surg.-General Babtie's. He proposed retaining the hospital ships at the front by transferring the less serious cases on board to transports at Mudros and landing the more serious for treatment in the hospitals on shore. The less serious cases were to be taken by ambulance carriers to Egypt, Malta and England.

The appointment of a Hospital Transport Officer at the Dardanelles under the Admiralty did not, however, result in any marked diminution of the complaints which reached the War Office. Incidents continued to occur of transports carrying large numbers of wounded direct from the Dardanelles to the United Kingdom without adequate provision for so long a voyage. This was markedly so during the landings at Suvla on 6th August and subsequent days, when there was practically as much confusion as at the original landings on 25th April in the embarkation of the wounded from the beaches. The appointment, therefore, failed to effect its object.

In a letter to Surg.-General Babtie dated 1st October 1915, Sir Alfred Keogh, the D.G.A.M.S., stated that "the dissatisfaction which has all along existed with the arrangements for the care and comfort of the sick and wounded on temporary ships has never abated and has grown in intensity." He therefore recommended that there should be a return to the

normal conditions of warfare by which the Quartermaster-General and the Naval Authorities were responsible for providing the ships, while the Medical Services were responsible that there was everything on board them necessary to ensure adequate nursing, feeding and medical treatment. The appointment of Hospital Transport Officer was consequently abolished and Sir James Porter handed over his responsibilities to the military staff at the end of November. Quite apart from the personality of the officers concerned, the appointment ended as other dual control appointments ended during the war. They were more likely to satisfy public opinion than to effect any real amelioration of the inevitable sufferings which war inflicts on its victims.

Surg.-General Babtie, after the abolition of the appointment of Hospital Transport Officer, assumed general control of the hospital ships based on Alexandria, running them under the authority of the General Officer Commanding the Levant Base, which had then been established in Egypt for supplying and reinforcing the Dardanelles and Salonika armies.

The development of the medical services on shore at Mudros progressed more satisfactorily than those at sea. New sites for hospitals were taken up on the western shore of Mudros Harbour, and the hospital accommodation on the island was greatly increased. At Mudros East the two British (Nos. 15 and 16) and the two Australian (Nos. 1 and 2) Stationary Hospitals, No. 24 C.C.S. and No. 5 Base Depôt of Medical Stores, had been opened since the end of May and beginning of June. No. 110 Indian Field Ambulance and " C " Section of No. 24 British Field Ambulance of the Indian Establishment were also on shore at Mudros acting as hospitals for the reception of sick and wounded from the 29th Indian Infantry Brigade and the Indian Mountain Artillery Brigade. Additional hospitals began to arrive in July and were established on the sites taken up on the west of the harbour. By August No. 3 Australian General Hospital of 1,040 beds, No. 18 Stationary Hospital, Nos. 1 and 3 Canadian Stationary Hospitals of 400 beds each, and No. 7 Base Depôt of Medical Stores had been opened on the new sites. No. 2 Australian Stationary Hospital was transferred from Mudros East to the western sites. A new casualty clearing station, No. 52, arrived on 5th July, and was also opened on the west of the harbour as a large convalescent depôt. A hutted general hospital, No. 27, had been requisitioned from England for Mudros at this time, but it did not arrive till November.

Pending its arrival, however, the site for it had been prepared. In addition to No. 52 C.C.S. an emergency convalescent depôt for 2,000 was organized at the West Point of Mudros harbour in December. By the middle of December, just before the evacuation of Suvla and Anzac, the following accommodation was ready on the West Point, Mudros :—

Units	Authorized accommodation	Expanded accommodation
No. 27 General Hospital	1,040	2,770
No. 3 Australian General Hospital ..	1,040	1,700
No. 2 Australian Stationary Hospital	624	1,200
No. 18 Stationary Hospital	624	1,340
No. 1 Canadian Stationary Hospital ..	624	1,000
No. 3 Canadian Stationary Hospital ..	624	1,000
No. 52 C.C.S. (Convalescent Depôt) ..	1,760	2,000
Emergency Convalescent Depôt ..	—	2,000
Total ..	6,336	13,010

The hospital accommodation at Mudros East was in three stationary hospitals, together with one casualty clearing station as a convalescent depôt. The details are lacking, but on the same scale of expansion as that of the corresponding units at West Point they would accommodate about 5,000 more.

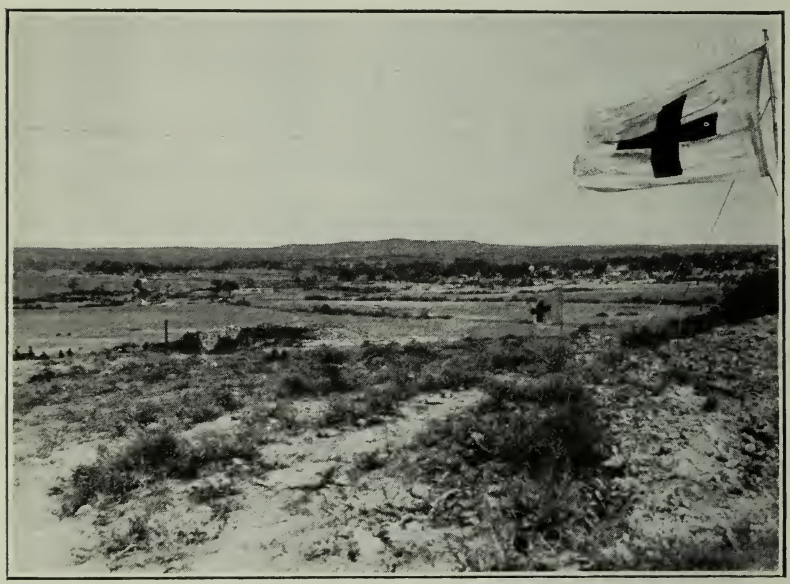
Owing to the growing importance of Mudros as a hospital centre, an A.D.M.S. was appointed both to Mudros East and to Mudros West, under the D.D.M.S., L. of C.

Hospitals were also established at Kephalos, on the island of Imbros. At first No. 25 C.C.S. opened there until it was transferred to Salonika on 5th October. A small local hospital, called the Kephalos Hospital, was then organized for the sick from rest camps on Imbros, but in preparation for the final withdrawal from the Peninsula it was greatly expanded, and eventually taken over by a stationary hospital, No. 19, which had been sent out from England on 13th November. This stationary hospital arrived at Mudros on 25th November *via* Salonika. It did not disembark at Kephalos, however, till 13th December, having been carried on the " Dunluce Castle " to Suvla, Mudros, Malta and back. It opened at Kephalos, with accommodation for some 600, a few days after landing.

No other hospital units than those mentioned were opened at Imbros or Mudros, but stationary hospitals were established on the Helles and Anzac fronts in October and November. No. 17 Stationary Hospital, which had functioned in Malta

as a convalescent depôt in August and September, landed at W beach, on the Helles front, and opened on an exposed site half-way between V beach and Gully beach. Its position was marked with the Geneva Cross and Flag, and, although shells occasionally fell near it, there is no evidence that it was ever intentionally fired on by the enemy.

No. 1 Australian Stationary Hospital was transferred at the beginning of November from Mudros to a site near No. 1 Australian C.C.S. on the Anzac front. It was much exposed to shell fire.



View of Achi Baba from the site of No. 17 Stationary Hospital.

On 18th December 1915, the Turks warned No. 11 C.C.S., which had remained from the time of landing, on 25th April, on the cliff at W beach, that they would no longer respect its position there, and gave it forty-eight hours to move to another site. Consequently, it was transferred to a position on the British right, near what was known as the Achi Baba Gully, alongside of a field ambulance of the Royal Naval Division, where it opened in dug-outs.

Bacteriological laboratories were sent to Mudros, Anzac and Helles. Until they arrived practically all the laboratory work for both British and French on the Helles front was carried

out by a laboratory with the French, under Méd.-Major Armand Delille, of the Pasteur Institute, whose assistance was invaluable.

Consulting surgeons and physicians and other specialists were appointed before the operations at Suvla commenced.* They were employed on shore and on the hospital ships, a consulting surgeon being always on one or other of the ships lying off the beaches.

On the Peninsula the field ambulances gradually assumed their normal functions, establishing advanced dressing stations

A Field Ambulance trench on the Helles Front. On sky-line on left are tents of No. 17 Stationary Hospital.

and main dressing stations, the former wherever protection could be found in gulleys, ravines or dug-outs, and the latter as a rule on or near the beaches. The 29th Indian Infantry Brigade was accompanied by No. 108 Indian Field Ambulance, and the Indian Mountain Artillery Brigade by "C" Section of No. 137 Indian Field Ambulance, "B" Section of the same field ambulance was attached for duty to the Indian Mule Corps when it landed at Suvla. No. 108

* Colonels Mayo Robson, Sir V. Horsley, Warren Low, Tubby and Ryan were employed as consulting surgeons. Sir R. Ross, Lieut.-Colonels Willcox and Purves Stewart acted as consulting physicians. Sir V. Horsley, Colonel Mayo Robson and Colonel Willcox spent much time with the medical units on the Peninsula. Colonel Ryan of the Australian Army Medical Corps landed on the Anzac front in the early days as a consulting surgeon.

Indian Field Ambulance came on board the " Ajax," a hospital ship organized for the use of the Indians, and this ship was employed for the reception of the more serious cases of sick and wounded of the brigade. Incidentally, the fine courage of the men of the Indian Army Bearer Corps of this field ambulance during the time they were on the Peninsula is worthy of mention. They worked under Major Battey, I.M.S., the Officer Commanding the field ambulance. Their courage and devotion was specially marked during the blizzard at the end of November, when they continued to collect and bring back wounded

Advanced Dressing Station on the Helles Front.

although many of them were suffering from frostbite and exposure.*

The 42nd Division had with it the 1st, 2nd and 3rd East Lancashire Field Ambulances, under the command of Colonel J. Bentley Mann, as A.D.M.S., till 29th June, and then of Lieut.-Colonel T. P. Jones.

Nos. 1, 2 and 3 Lowland Field Ambulances of the 52nd Division did not land at Helles until some days after the division landed. No. 1 Lowland Field Ambulance landed on 27th June, six days after the division, No. 3 Lowland Field Ambulance on 3rd July, and No. 2 not until 30th August. Colonel F. J. Brown, the A.D.M.S. of the Division, was replaced on 24th June by Major A. M. Mackintosh.

* The same courage and devotion to duty signalized the work of the Indian Army Bearer Corps with the Indian field ambulances in France.

Australian Light Horse Brigades and Scottish Horse Brigade Field Ambulances also came to the Peninsula when their formations were sent as reinforcements from Egypt. Consequently on 21st May Nos. 1 and 3 Light Horse Brigade Field Ambulances, and later on, in August, No. 2 Light Horse Brigade Field Ambulance were added to the medical units at Anzac. The Scottish Horse Field Ambulance went to Suvla.

One of the greatest difficulties experienced by the medical units on the Peninsula was due to the wastage of their stretchers. Hand carriage was the chief, almost the only method of bringing

Dressing Station on the Helles Front.

the seriously wounded from the trenches to the beaches, and an adequate supply of stretchers was essential. Yet both at the original landings and the Suvla Bay landings the stretchers of the field ambulances had been placed, with the wounded on them, on the boats and taken to the transports, where, in the absence of cots or a sufficient number of cots, they were retained. The number of the stretchers on shore thus rapidly diminished, as they were not replaced for a considerable time afterwards. Wheeled stretcher carriers of various kinds and designs were used, and both at Helles and Suvla motor ambulance cars and a field ambulance workshop unit were landed. They were not, however, able to cover much of the ground on account of the want of suitable roads. At Helles about fourteen cars were landed. They were kept by the D.D.M.S., VIIIth Corps,

under his own control. The longest run they could make was along an indifferent cliff road from W beach to above Gully beach, where, however, the cars were in full view of the enemy, and at least one of them was destroyed by shell fire. On several occasions the D.D.M.S., VIIIth Corps, lent his cars to the medical services of the French Corps.

The whole of the Helles and Anzac fronts eventually became a network of trenches. The trenches, however, were narrow, especially in the earlier stages of the operations, and no separate trenches had been allotted for bringing back the wounded Stretcher bearers, consequently, during severe fighting found it

One of the living trenches on the Helles Front.

extremely difficult to bring the wounded back along the trenches congested with reinforcements coming up. On the French sector the arrangements were much better, as they had separate trenches for reinforcements coming up and for the sick and wounded going down.

In preparing for the combined attack at Helles, Anzac and Suvla on 6th August, Surg.-General Birrell estimated the probable casualties at 30,000. No new arrangements were made on the Helles front, but on the Anzac and Suvla fronts a number of new casualty clearing stations were landed. No. 13 and No. 16 went to Anzac on 8th August and opened near No. 2 and No. 1 Advanced Posts on the left of the Anzac positions. No. 14 was established on the Suvla front on C

beach on 7th August, about 1,000 yds. south of the Lala Baba hill. No. 26 C.C.S. landed on 8th August and opened in a gully, protected by rocky ground, about one mile east of Suvla point. No. 53 C.C.S. also went to Suvla Bay, and landed on 11th and 13th August just north of the entrance to Salt Lake. No. 54 C.C.S. was the last of the casualty clearing stations sent to the Peninsula. It opened alongside No. 26 on 18th October.

The field ambulances of the divisions which arrived for these operations were :—

Nos. 30, 31 and 32 Field Ambulances with the 10th Division.
Nos. 33, 34 and 35 Field Ambulances with the 11th Division.

Shelter for wounded on the Helles Front.

Nos. 39, 40 and 41 Field Ambulances with the 13th Division.
1st, 2nd and 3rd Welsh Field Ambulances with the 53rd Division.
2/1st, 1/2nd and 1/3rd E. Anglian Field Ambulances with the 54th Division.
2nd and 4th Mounted Brigade Field Ambulance, Scottish Horse Mounted Brigade Field Ambulance with the 2nd Mounted Division.
Nos. 5, 6 and 7 Australian Field Ambulances with the 2nd Australian Division.

The field ambulances of the new divisions arrived incomplete in many respects, and one, No. 3 East Anglian Field Ambulance of the 54th Division, lost most of its equipment at

sea on its way to the Peninsula on board the transport " Royal Edward," which was sunk by an enemy submarine. In the case of the IXth Corps, 53rd and 54th Divisions, the fatal error had been made of embarking the personnel and equipment of their field ambulances on different transports in England, with the result that for some time after the divisions landed in August the field ambulances were practically helpless without their equipment, and assistance had to be obtained from other divisions. The personnel of the ambulances which had arrived without their equipment could only be employed as stretcher bearers or as reinforcements for other field ambulances.

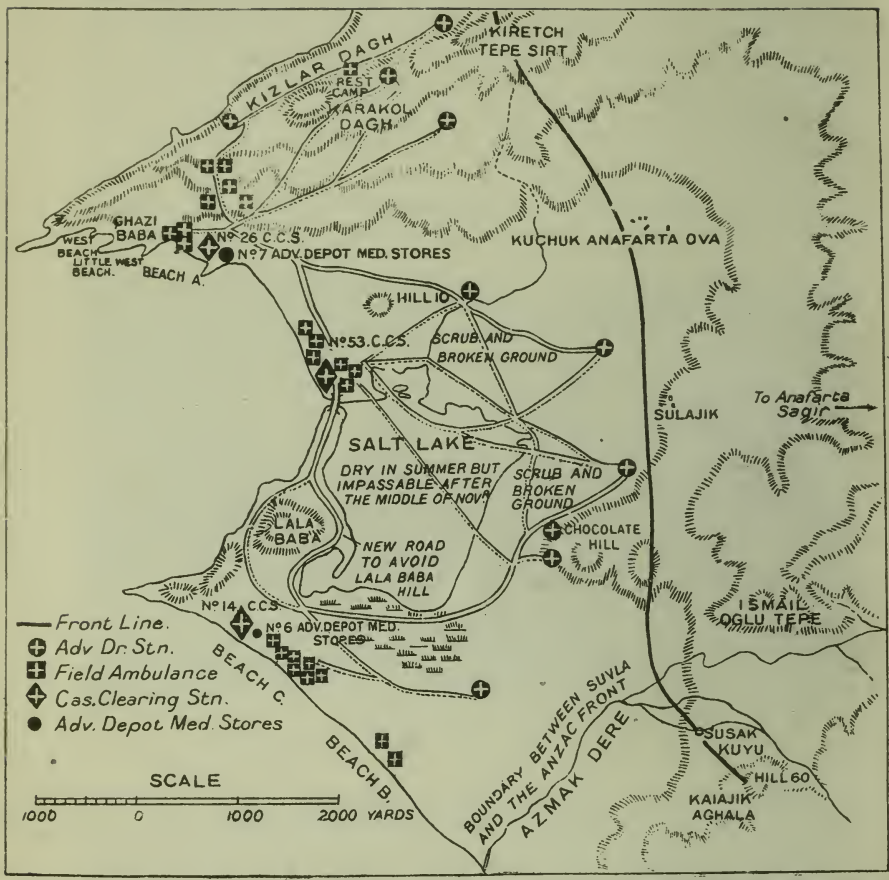
Fortunately, the casualty clearing stations on the beaches at

Carrying wounded back from the firing line, Dardanelles.

Suvla and Anzac were able to take the place of field ambulance main dressing stations for the time being, so that the want of equipment was not felt so much as would otherwise have been the case. In fact, the tent divisions of field ambulances were grouped as a rule in the neighbourhood of, or alongside, the casualty clearing stations.

The casualty clearing stations were to receive the sick and wounded from the field ambulances, embark the more serious cases on the lighters going to the hospital ships, and the slighter cases on the mine sweepers for conveyance to transports at Mudros. But this arrangement for ensuring classification of the wounded broke down at the landing on Suvla Bay, just as it had broken down at the landings on Helles and Anzac on 25th April, and from much the same causes. The wounded

To face page 49.



SKETCH MAP OF SUVLA FRONT SHOWING THE GENERAL POSITIONS OCCUPIED BY MEDICAL UNITS FROM THE LANDINGS ON 7TH AUG. TO WITHDRAWAL ON 19TH DEC. 1915.

1326 Malby & Sons Lith.

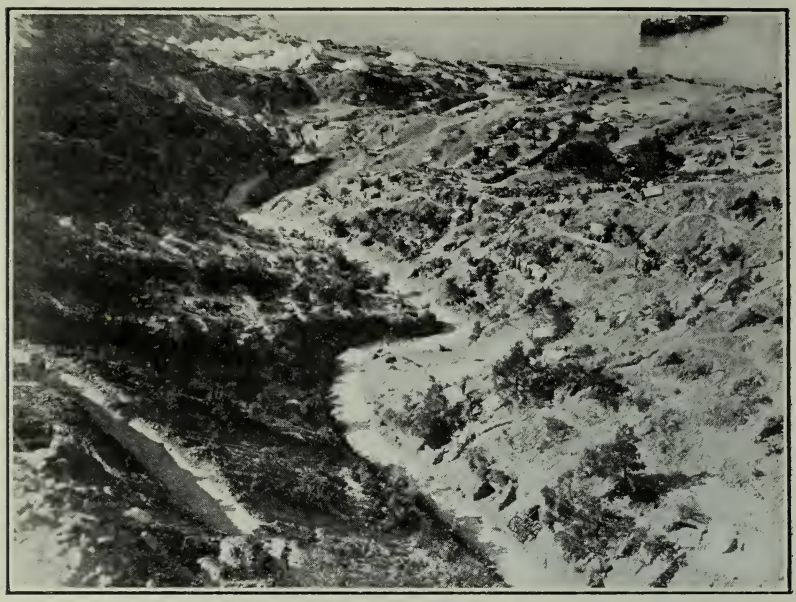
waiting embarkation at the beaches were exposed to rifle and artillery fire as they lay on the stretchers and had to be embarked on boats as rapidly as possible. Severely and slightly wounded were consequently embarked indiscriminately and sent to hospital ships or transports without classification. The transatlantic liner, " Aquitania," amongst others received a great number of wounded, and was ordered to sail for England direct, although it had not been equipped or staffed for a long voyage with a large number of seriously wounded on board.

Slightly wounded waiting in gully near an advanced dressing station, Dardanelles.

Fortunately, a consulting surgeon, Colonel Mayo Robson, went to England with the wounded, and the best that was possible in the circumstances was done for them as regards surgical operations and surgical care.

The sketch maps show the general medical situation during these final operations on the Peninsula.

The medical arrangements for the withdrawal from the Peninsula were very complete. As already noted, a large number of casualties was anticipated, although practically none occurred. Two hospital ships were off the beaches at



Gully leading to the casualty clearing station at Anzac.

A field ambulance position, Anzac.

Anzac, and eleven, together with three ambulance carriers, were ready at Mudros. The two large liners, the " Aquitania " and " Britannic," each capable of carrying between 3,000 and 4,000 patients, had been equipped as hospital ships and were due to arrive at Mudros about the time of the evacuation of Suvla and Anzac. Another large liner, the " Mauretania," also came up to Mudros shortly after the evacuation of Helles. These three large steamships were filled with patients from the hospitals at Mudros and with patients sent to Mudros from Alexandria and Malta, as they were too large for the harbours at these bases. The " Aquitania " sailed for England from Mudros with 3,654 sick and wounded on the 26th December, the " Britannic " with 2,989 on the 29th December, and the "Mauretania" with 1,972 on the 17th January. On 14th December there had been in hospitals and convalescent depôts in Mudros some 11,768 sick and wounded, so that these three hospital ships alone were able in one voyage to clear the majority of the patients to England.*

North Beach, Anzac, with casualty clearing station.

At the time the decision had been made to withdraw from the Peninsula, the following depôts of medical stores were with the Mediterranean Expeditionary Force :—

Mudros West	..	Nos. 5 and 8 Base Depôts.
Helles ..	..	No. 5 Advanced Depôt.
Suvla ..	..	Nos. 6 and 7 Advanced Depôts.
Anzac ..	..	Nos. 4 and 8 Advanced Depôts.

The arrangements for evacuation from the shore were intended to provide for a considerable number of casualties being left behind in the event of it being impossible to clear them from the beaches before the enemy took over the

* The use of these large ships as floating hospitals at Mudros had been suggested several times, but the difficulties of coaling and supplying them with water were too great to permit of this. It was also pointed out that in bad weather, when probably they would be wanted most, it would be impossible to transfer patients on board from the mine sweepers.

abandoned positions. Water supplies, rations, blankets, stretchers and mattresses were accumulated in sufficient quantity for the care of 2,000 to 3,000 patients for fifteen to thirty days. The medical units left in charge of them were given a written instruction, in Turkish and French, explaining their position should they be captured by the enemy. The instructions and orders issued for the medical services during the final period of evacuation from Suvla, Anzac and Helles were as follows :—

Medical Arrangements for the Final Stage of Evacuation from Anzac.

" 1. *Personnel retained for duty :—*

	Officers	Others
(*a*) No. 13 C.C.S.	5	69
No. 1 Australian C.C.S.	7	71

(*b*) Divisional medical units.

Ten N.C.O.'s and men for each 1,000 troops, drawn from the bearer divisions of field ambulances, have been detailed to work under the regimental medical officers.

All other medical units and personnel have been withdrawn.

" 2. *Equipment and supplies :—*

(*a*) Casualty clearing stations have been stocked with 30 days supplies of food, fuel, light, comforts, etc., for 1,200 patients, with ample medical and surgical supplies. Each has under guard and red cross flag 6,000 gallons of water, and an additional 70,000 gallons, not earmarked, with water carts and mules, has been left behind.

(*b*) The camps of field ambulances, dressing stations and aid posts are still standing and have been equipped with stretchers, blankets, food, dressings, etc., for use by personnel from casualty clearing stations or from the bearer divisions.

A total equipment for 3,200 patients has been arranged and 30 days supplies for British and 60 for Indian troops provided.

" 3. *Embarkation :—*

(*a*) Patients. Serious cases are to be embarked only by daylight at first ; slight cases can embark with their units. On the last night very serious cases are not to be brought to the C.C.Ss. but are to be left in dressing stations or on the spot where wounded, with a view to being subsequently collected. These sites are to be marked on the last night with red cross flags, their sites being marked on a plan furnished to the S.M.O. remaining.

(*b*) Equipment. All valuable surplus equipment, except tents, and all permanent records, etc., were embarked at an early stage. Temporary records are now being kept.

(*c*) Medical units and personnel. The two C.C.Ss. are held ready to embark at a moment's notice on receiving written orders to that effect from the commander of the rearguard. All arrangements have been made in advance, and the scale and composition of personnel to be left behind have been laid down in accordance with the number of casualties. Stretcher bearers, unless specially retained, will embark with the units to which they have been attached for the occasion."

Medical Arrangements for the Final Stage of Evacuation from Suvla.

" A. *Personnel, casualty clearing stations.*

1. A personnel of 4 officers and 24 other ranks has been left to carry on the duties of the combined 26th and 54th C.C.Ss., and 3 officers and 23 other ranks to carry on the 14th C.C.S.

2. Arrangements have been made with A.Ds.M.S. of Divisions for the following personnel of the bearer divisions of field ambulances to be employed in the final stage :—

11th Division	..	10 officers	..	220 other ranks	
13th ,,	..	10 ,,	..	220 ,,	,,
29th ,,	..	4 ,,	..	75 ,,	,,
2nd Mtd. ,,	..	3 ,,	..	50 ,,	,,

B. *Equipment, stores, etc.*

1. Sufficient medical and surgical equipment and stores, including medical comforts, dressings, blankets, fuel, light, etc., are collected at C.C.Ss. to allow of sufficient and ample attention for 14 days to 2,000 patients.

2. Divisional medical officers and stretcher bearers are supplied with ample surgical and medical equipment, etc., and with an ample number of stretchers.

C. *General.*

1. *Water supply to casualty clearing stations.*

(*a*) *Right Flank.* No. 14 C.C.S. Six mules and 12 camel tanks are available from " C " beach.

(*b*) *Left Flank.* Nos. 26 and 54 C.C.Ss. Arrangements have been made for tanks.

An ample supply is ensured for both.

2. *Embarkation of sick and wounded.*

This will take place under the supervision of the E.M.O. at West and Little West Beaches, and under the supervision of the O.C. No. 14 C.C.S. at " C " beach, in conjunction with the N.T.Os. concerned.

3. *Interpreters* for C.C.Ss. under consideration.

4. *Semblance of occupation of camps.*

(*a*) Stringent orders have been issued to all concerned that no tentage, dug-out, etc., is to be altered or removed, and that flags, where previously flying, should remain.

(*b*) Sufficient personnel remains to keep fires, incinerators, etc., going, and to move about to give a semblance of occupation to camps and areas vacated by medical units till the commencement of the final stage.

5. *Reserve of medical officers.*

Six medical officers and 40 other ranks, R.A.M.C., in reserve, will be placed on a man-of-war to be drawn from if necessary by the O.Cs. C.C.Ss. on demand through naval signal office.

6. *Embarkation of C.C.S. remaining party.*

In the event of light or no casualties being admitted and held up in clearing stations the Naval Authorities will take early opportunity to embark the personnel of these."

Medical Arrangements for the Final Period of Evacuation from Helles.

" A. *No.* 17 *Stationary Hospital and No.* 11 *Casualty Clearing Station.*

1. A personnel of 4 officers and 24 other ranks will be left to carry on the duties of each of the above units.

2. A personnel of 6 officers and 40 other ranks will be placed on a warship as reserve to the above in case they should be required on the day following the embarkation.

3. Sufficient medical and surgical equipment and stores, including rations, medical comforts, dressings, blankets, fuel, light, etc., have been collected to allow of sufficient and ample attention for 14 days to 1,600 patients.

4. Water supply has been arranged by means of 4 mules and 8 Egyptian tanks with a pump and tube for each of the above to draw water from the well near "W" beach.

5. As no interpreters can be provided and in case the personnel of these units cannot be evacuated, they will be provided with copies of a notice in Turkish and French to the following effect :—

"I am not a fighting soldier, my only work is in connection with the wounded and sick in hospital and in the field under the protection of the Geneva Convention."

6. In the event of light or no casualties being admitted and held up in the above units, instructions will be given when the final retirement has commenced for the personnel to retire with their medical and surgical panniers to "W" beach for embarkation.

"B. *Medical arrangements in the field.*.

1. The A.D.M.S. of the R.N., 13th, 29th and 52nd Divisions will each arrange for a personnel of 10 medical officers and 220 other ranks, R.A.M.C. from bearer divisions of field ambulances to be employed in the field during the final period.

2. These will be supplied with the necessary medical and surgical equipment and with an ample number of stretchers.

3. The embarkation of sick and wounded will take place at V, W, X and Gully Beaches. A medical officer has been detailed to supervise this at each beach in conjunction with the embarkation staff.

4. During the final period, all wounded will, as far as possible, be evacuated with the troops, and not taken into either No. 17 Stationary Hospital or No. 11 C.C.S.

5. Any sick and wounded in either of the above, or in field ambulances, will be evacuated to hospital ships by dusk on the final night.

"C. *Maintenance of appearance of occupation of camps, etc.*

1. Strict orders have been issued to all concerned that no tents, dug-outs, etc., are to be altered or removed in any way, and that red cross flags, where previously flying, shall be kept flying.

2. Sufficient personnel will be left in each camp, etc., to keep fires and incinerators going, and to move about to give a semblance of occupation to all camps and areas vacated by medical units.

3. Particular care will be taken that all packing of surplus stores for removal is done inside tents and that no dumps of those ready for removal are made outside tents by any medical unit.

4. If the personnel of No. 17 Stationary Hospital and No. 11 C.C.S. are evacuated, arrangements will be made to have all lamps and lights burning when they march out."

Extract from Dardanelles Army Order No. 2.

"Army Headquarters,
Dardanelles Army.
1st January 1916.

"During the intermediate stage and the first night of the final stage the arrangements for the evacuation of sick and wounded will be normal. During the final stage lightly wounded cases must embark with the fighting troops.

Two hospital lighters will be provided for conveyance of badly wounded cases to the hospital ship. Other hospital ships will be held in readiness at Mudros or Imbros to come up at short notice.

Hospital accommodation for 2,000 patients, together with the medical personnel required for their care, will be organized to receive such cases as cannot be evacuated during the final stage.

Arrangements will be made to store in selected areas 14 days' rations and water, with a due proportion of medical comforts for the above number of patients.

On the last night the Corps Commander may, at his discretion, withdraw such medical personnel as he considers to be in excess of requirements, should the above preparations prove to be excessive.

If any wounded are left on shore an endeavour will be made to embark them under a flag of truce after the completion of the operation."

The arrangements made by the A.D.M.S., 52nd Division, and its 1/3rd Lowland Field Ambulance are typical of the way in which the medical services were employed during the withdrawal. They were as follows :—

" *Scheme for evacuation, Z night* :—

Divisional troops hold line from Nullah on left to Point P. 1 on right. Routes of evacuation—

1. Plymouth Avenue—Mule Trench—Achi Baba Nullah. Dressing Station of No. 3 Lowland Field Ambulance at Romanos Well.

2. Central Street—Achi baba Nullah.

No. 3 Lowland Field Ambulance to man both routes.

Troops to go in three trips, commencing 7.30 p.m. and ending 11 p.m.

1,150 fighting troops and details and 50 R.A.M.C. to go on first trip.

1,150 fighting troops and details and 130 R.A.M.C. to go on second trip.

310 fighting troops and details and 40 R.A.M.C. to go on third trip.

Times given are those at which parties would reach forming-up places. That for the 52nd Division just west of Sedd-el-Bahr Fort. Men in reserve lines were to go by first trip and with them 50 men from Eski Line.

Stretcher bearer parties to be attached to each 50 men.

Casualties arising in groups to be taken direct to divisional rendezvous and thence to beach.

Medical arrangements, Z night :—

1. Captain W. W. Greer, Officer Commanding 1/3rd Lowland Field Ambulance, in charge and left at Brigade Headquarters, 156th Brigade.

2. Captain Angus, 1/2nd Lowland Field Ambulance, Beach Medical Officer.

3. Field ambulance officers stationed at Nos. 7 and 8 control posts, from which bearers to carry wounded assisted by troops. If stretchers not available elsewhere, troops to carry wounded to Bearer Posts. Two bearers and 1 stretcher allotted to each 50 men. These bearers spread between 8 posts and the divisional rendezvous. Bearers to accompany parties of 50 and embark with them.

4. Three ambulance wagons with 9 R.A.M.C. at divisional rendezvous.

5. Regimental medical officers with their own battalions."

The medical arrangements as above worked smoothly. Control posts one to seven, were manned at 6 a.m. of 8th January by men at ordinary relay posts in the Achi Baba Nullah evacuation route. These men were relieved during the day by control post parties. At 4 p.m. the two dressing stations were evacuated and control posts manned as above. At 9 p.m. Lieut. Miller, 1/3rd Lowland Field Ambulance, at No. 7 control post, left to report at divisional rendezvous, to embark with the second party.

Captain Walker, 1/3rd Lowland Field Ambulance, at No. 8 Post, stayed till every R.A.M.C. man had passed through and until he was satisfied that there were no wounded with parties left to block the communication trenches. He then reported to divisional rendezvous. Captain Philip, 1/2nd Lowland Field Ambulance, at No. 8 Post, assisted Captain Walker till 9.30 p.m. when he reported at divisional rendezvous and left with the second party.

The first party formed up at the Rest Camp at 6 p.m. With this party were forty-eight R.A.M.C. men, Lieut. Scantlebury, 1/2nd Lowland Field Ambulance, and Lieut. Craig, 1/3rd Lowland Field Ambulance. It moved off from the Rest Camp at 6.15 p.m. and embarked without a hitch.

The second party formed up at the Rest Camp at 8 p.m., 390 strong of the 156th Brigade. Twenty-five R.A.M.C. were sent to the Rest Camp and were included in it, *i.e.*, two bearers to every fifty men and four spare stretchers. These R.A.M.C. men were distributed amongst the troops.

The remainder of the R.A.M.C. and three ambulance wagons went to divisional rendezvous at 7 p.m.—three and sixty-three strong. They were gradually added to the parties coming down from the firing line. As all was quiet, efforts were made to embark all spare stretchers, but the sea was rough and prevented this.

Two men of the second party carrying machine guns reached divisional rendezvous exhausted, and were sent to the beach in an ambulance wagon. This was the only time an ambulance wagon was used. There were no other sick or wounded to evacuate.

At 1.20 a.m. of 9th January, four officers and forty-seven R.A.M.C. other ranks, remaining at divisional rendezvous, left for the beach. The police followed, they being the last of the 52nd Division.

The medical arrangements were thus carried out without a hitch, and had the happy result that no sick and wounded or other personnel were left behind, as had been considered unavoidable at the time the instructions were issued.

The medical preparations, consequently, for the large number of casualties that were anticipated during the withdrawal were in marked contrast with the preparations for the original landing on the Peninsula. They were in a way epigrammatic, for at the original landing the medical services were quite unprepared for what happened, whereas at the time of the withdrawal they were fully prepared for what did not.

Surg.-General W. G. Bedford had replaced Surg.-General Birrell as Director of Medical Services at G.H.Q. on 19th September 1915, and was responsible for the medical arrangements; but when the Mediterranean Expeditionary Force included under Sir C. Monro the armies of the Dardanelles and of Salonika, he appointed Colonel C. C. Reilly, previously A.D.M.S. of the 13th Division, to be D.D.M.S. of the Dardanelles Force on Sir W. Birdwood's staff, with his headquarters at Kephalos. Colonel Reilly had consequently to work out the details for the withdrawal with the A.Ds.M.S. of the divisions concerned. The Anzac Corps was without a D.D.M.S. until 11th September 1915, when Colonel N. Howse, then A.D.M.S. 1st Australian Division, was appointed.

Although the system of employing surgical teams in casualty clearing stations and operating centres had not been adopted during the Dardanelles campaign in 1915, several surgical specialists were doing duty both in the casualty clearing stations and more especially in the medical units of the Territorial Force divisions. The Scottish Horse Mounted Brigade Field Ambulance also took with it to the Suvla beach in September 1915 the motor surgical car, which has been described elsewhere.*

The approximate number of casualties month by month in the Mediterranean Expeditionary Force is shown in the following table :—

1915.	Killed or Died of W.		Wounded.		Missing.		Total.	
	Offs.	O.Rs.	Offs.	O.Rs.	Offs.	O.Rs.	Offs.	O.Rs.
April 25-30th	133	2,103	259	6,334	3	209	395	8,646
May ..	226	4,447	516	11,771	1	140	743	16,358
June ..	307	4,548	479	11,274	50	1,196	836	17,018
July ..	136	1,878	224	5,456	11	449	371	7,783
August ..	637	10,130	1,110	29,475	182	5,304	1,929	44,909
September	63	1,398	130	3,509	2	49	195	4,956
October	46	889	118	2,502	2	22	166	3,413
November	61	1,313	96	3,050	1	19	158	4,382
December	41	678	59	1,627	—	13	100	2,318
January 1916	10	345	19	512	—	1	29	858
Total	1,660	27,729	3,010	75,510	252	7,402	4,922	110,641

The number of admissions for disease cannot be accurately ascertained, as they were not fully recorded at certain phases

* *See* Vol. I Surgery of the War, Chap. XIII, p. 312. Vol. III General History Medical Services, Chap. XXII, p. 462.

of the operations ; but so far as the admission and discharge books of the medical units are concerned the numbers admitted for diseases during 1915 on the Peninsula amounted to 84,084. This must, however, be regarded as short of the actual number. The number of deaths from disease amongst the 84,084 was recorded as 1,307 ; but the Statistical Abstracts published by the War Office give the number as 3,982, including 115 officers ; so that there is very great discrepancy between the two records. The blizzard at the end of November 1915 alone accounted for nearly 16,000 admissions on account of frostbite and exposure, 12,000 of whom were from the Suvla front, 2,700 from Anzac, and 1,200 from Helles ; in addition, 280 were drowned or died of exposure. It is also recorded that the number evacuated sick from the Peninsula amounted at times to 1,000 daily. The sick rate was especially high in the summer and autumn months, chiefly from dysentery and other intestinal complaints. In August and September seventy-eight per cent. of the troops were said to be suffering from these diseases, sixty-four per cent. had septic sores, and fifty per cent. of the old troops who had been longest on the Peninsula showed symptoms of cardiac debility.

Although the rations were good there were no means of varying their monotony until a field canteen, where purchases of luxuries could be made, was sent out in September. The want of canteens was very much felt, and when one did arrive its supplies were insufficient to meet all demands and were rapidly sold out.

The sanitary sections employed throughout the operations were :—

At Mudros	..	Nos. 18 and 19, together with a laboratory.
At Imbros	..	No. 28.
At Helles ..	..	No. 16.
At Suvla ..	..	Nos. 22, 53 and 54.
At Anzac ..	..	Nos. 21 and 24.

The sanitary conditions on the Peninsula were at times deplorable. No administrative sanitary officer had been appointed to the D.M.S. staff at G.H.Q. until July 1915, when Lieut.-Colonel A. R. Aldridge, from the reserve of officers, joined it as A.D.M.S. (Sanitation) on 31st July 1915. But the chief cause of the sanitary defects was the difficulty in obtaining a sufficient supply of wood, corrugated iron or other material for constructing fly-proof latrines and protecting kitchens and food from flies. Much of this material had

been lost at sea. Incineration was not permitted to any great extent for military reasons.* The ground was not suitable for deep pits as a general method of disposing of waste products. The proximity of the enemy lines and the large number of dead were also a source of trouble. On the Anzac front an armistice of several hours was arranged with the enemy for the purpose of burying the dead on 23rd May 1915; but when a similar armistice was asked for on the VIIIth Corps front it was not sanctioned.

The result of these sanitary difficulties was a plague of flies and a general outbreak of dysentery and diarrhœa. Scarcely an officer or man escaped. A Sanitary Advisory Committee, consisting of Colonel W. Hunter, Lieut.-Colonels G. S. Buchanan, A. Balfour and Dudgeon, was appointed by the War Office to deal with the problem of epidemic and infective diseases in the Mediterranean. They arrived in Egypt in July 1915, and inspected Mudros, Helles, Anzac and Suvla fronts subsequently. Major E. E. Austen, an entomologist, and Major P. S. Lelean, R.A.M.C., were also sent to the Dardanelles to devise methods of fly destruction, and to lecture to the troops on sanitation. When the weather began to get colder and flies to disappear, there was a marked diminution in the number of admissions for intestinal diseases.

Malaria was never a prominent cause of inefficiency, although the coast areas of the Gallipoli Peninsula were notoriously malarial. Sir Ronald Ross was asked to advise on the means of prevention, but no special measures appear to have been taken.

Outbreaks of cholera and typhus were feared owing to reports of these diseases being prevalent amongst the Turks. A very large proportion of the men, 100 per cent. in the 29th Division, were inoculated against cholera. No case of the disease occurred, nor was there any case of typhus.

Disinfection of clothing was effected chiefly by improvised disinfectors, such as the Serbian barrels, but large steam disinfectors were obtained and landed on the Peninsula. For ablution the men had to depend on sea bathing, which was by no means without risk, as noted below, from enemy fire, nor always very pleasant in consequence of the number of dead animals that were constantly being washed ashore on the beaches.

* A large quantity of horse litter was placed in one of the ravines and set on fire. It helped the enemy to register his guns, but for some days it was impossible to put the fire out.

The measure which proved of greatest value in restoring the health and vigour of the troops was the formation of rest camps. In July these were established at Imbros, and men worn out by long and monotonous existence on the cramped spaces of the Peninsula came back new men after a period of rest in the camps. Similar camps were opened on the Gulf of Xeros side of the Karakol Dagh on the Suvla front, where there was much greater freedom from hostile fire.

At no time was gas used by the Turks or British on the Peninsula, but precautions were taken to supply the men with

Men bathing south of "X" beach, Helles front.

masks and instruct them in their use, gas experts being sent to the Peninsula for this purpose.

The medical services suffered from wound and disease casualties to a very large extent, especially during the landings. Battalion medical officers, on becoming casualties, had to be replaced from field ambulances and it was some time before the depleted ranks of the latter could be reinforced. Consequently these medical units were always short-handed, more so probably than in any other theatre of war. There is no record of the number of casualties amongst the Dominion and Royal Navy medical officers, but in the R.A.M.C. there were twenty-three deaths amongst the officers and ninety-five amongst the other ranks. Six of the officers were killed in battle, eight died of

wounds and nine from other causes ; twenty-two of the other ranks were killed, twenty-four died of wounds and forty-nine of disease.

Colonel N. Manders was killed by a spent bullet when sitting outside his dug-out on 9th August, and was succeeded as A.D.M.S. of the New Zealand and Australian Division by Lieut.-Colonel C. M. Begg. Many men had been similarly killed or wounded by spent bullets while bathing, especially at Gully Beach and at the Anzac and Suvla beaches ; but throughout the whole period of the campaign the beaches and boats running to and from them were constantly under artillery fire. At no time, therefore, could nursing sisters be employed on the Peninsula, but they served in the hospitals at Mudros and on the " ambulance carriers " and hospital ships.

CHAPTER II.

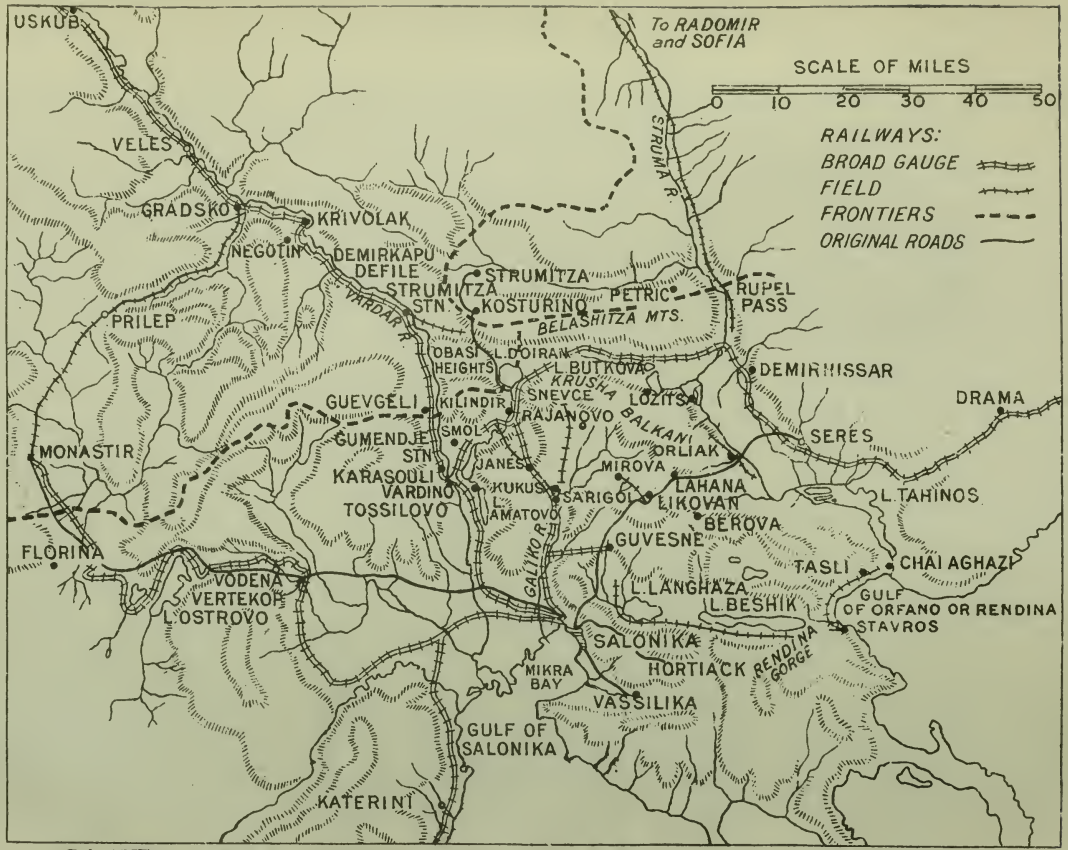
THE MACEDONIAN FRONT.

THE possibility of sending a British or Allied force to assist Serbia first came under consideration when Bulgaria ranged herself on the side of the Central Powers in September 1915, and early in October two French divisions from France, and the British 10th Division, under Sir Bryan Mahon, and one French division, from the Dardanelles, disembarked at Salonika.

The French divisions, under General Sarrail, advanced into Serbia by the Vardar Valley, and took up a line for the protection of the Uskub-Salonika railway and the right flank of the Serbian Army. They occupied Gradsko, Krivolak and Strumitza stations on the railway, the mountains eastwards of the Vardar Valley to Kosturino on the Serbo-Bulgarian frontier, and the hills east of the Kosturino-Doiran road. Kosturino is ten miles north of Lake Doiran and five miles south of the village of Strumitza, in Bulgaria, and a Bulgarian attack was threatening from that direction; but, as Great Britain did not declare war against Bulgaria till the 14th October the 10th division remained at Salonika until the 27th of the month, when two of its battalions were sent to Kosturino to relieve the French. The remainder of the division followed on the 12th November, and took up positions on the hills eastwards of the line Kosturino-Doiran.

The French on the Vardar endeavoured to get in touch on the left with the Serbian Army in the direction of Veles and Uskub, but when this was found impossible, owing to the right wing of the Serbian Army being obliged to fall back in a south-westerly direction on Prilep and Monastir, they were forced to withdraw from Serbia through the Demirkapu defile, which ran northwards from Strumitza station towards Krivolak. During the retreat of the French, the 10th Division, on the Kosturino-Doiran front, protected their flank; it was under orders to hold its ground till they had got clear of the defile; but before the 10th Division had extricated itself it was heavily attacked on the 6th, 7th and 8th December by a large Bulgarian and German force that had been concentrated in the Strumitza Valley. The 22nd, 27th and 28th Divisions had by now arrived from France and were in camp in the neighbourhood of Salonika;

To face page 63.



SKETCH MAP OF THE AREA OF OPERATIONS IN MACEDONIA

Malby & Sons Lith.

so a brigade of the 22nd was sent up to support the 10th Division, and eventually the retirement from Serbia was effected after some severe fighting, although with comparatively small loss of men and material.

The French and British divisions, after they had withdrawn from Serbia, were concentrated around Salonika and entrenched on a line from Stavros, on the Gulf of Orfano, to the delta of the Vardar at a distance of some eight to ten miles north-east, north and north-west of Salonika. Most of the line from Stavros to Salonika across the neck of the three-pronged Chalcidician Peninsula was protected from an enemy advance by mountains and by the Beshik and Langhaza lakes, which stretched from east to west for some thirty miles with a marshy gap, which, however, was dry in summer, between them. From the slopes of the mountains south of the latter lake to the Galiko river, west of Salonika, the British constructed a strong line of trenches, which they held with the 27th, 28th and 22nd Divisions. A brigade of the 10th Division was sent to Stavros and occupied the short strip of land forming the Rendina Gorge between the sea and Beshik Lake. The remainder of this division was in camp east of Salonika. A fifth division, the 26th, arrived from France at the beginning of January and took up its position in the entrenched camp north of Salonika. The French divisions extended the line from the Gaiiko to the Vardar on the British left. A mounted brigade, composed of Yeomanry regiments, patrolled the area between the entrenched positions and the Greek frontier, beyond which the Bulgarian forces had not advanced after the allied troops had withdrawn from Serbia. Its headquarters were at Kukus, about sixteen miles south of Lake Doiran and twenty miles north of Salonika.

At first Lieut.-General Sir Bryan Mahon was in command of the British force, and General Sarrail of the French, but on the 16th January 1916 the latter was appointed Commander-in-Chief of all the Allied Forces in Macedonia.

The British and French troops were now busily engaged within the entrenched camp in consolidating the defences of the Salonika perimeter, constructing roads and railways and generally improving the communications and facilities for disembarking stores and transporting them from the harbour to the dumps and camps. There were for a time no active hostilities as the distance between the opposing forces was twenty or more miles. Enemy aeroplanes and airships, however, frequently bombed the camps and the harbour and did a considerable amount of damage.

The British divisions were formed into two corps; the 22nd, 26th and 28th Divisions composed the XIIth, under Lieut.-General Sir H. F. M. Wilson; and the 10th and 27th the XVIth, under Lieut.-General Sir G. F. Milne.

Salonika became the base, and for a time it was also the headquarters of the lines of communication, but in 1916 Major-General J. Adye, the Inspector-General of Communications, was transferred to Egypt and the L. of C. and Base Staffs were then merged into one under the G.O.C. of the Base as a Base and L. of C. Command. The Army Headquarters were in Salonika, XIIth Corps Headquarters at Lembet, about two or three miles north of Salonika, and XVIth Corps Headquarters in a village, Kirechkoi, in a mountain valley four to five miles east of the city.

Sir Bryan Mahon was transferred to a command in Egypt on the 9th May 1916 and was succeeded by Lieut.-General G. F. Milne. Shortly after the latter took over the command a new situation arose. Bulgarian troops crossed into Greek territory and occupied important positions at the entrance to the Rupel Pass, by which the Struma Valley and the Gulf of Orfano were reached from Bulgaria. The allied forces were then moved forward from their entrenched camp. French troops were placed on the right to watch the right bank of the Struma and the Greek frontier between it and Doiran, while a mixed British force of one division and the mounted brigade were pushed forward to the north of Kukus in support of the French. Arrangements were then made for the British Army to take over from the French the whole front covering Salonika from the east and north-east, and on the 8th June General Milne's divisions commenced to occupy advanced positions along the right bank of the Struma, from Lake Tahinos to the village of Lozitsa, on the Lake Butkova.

During May 1916 the Serbian Army, which had been reconstituted on the Island of Corfu after its retreat through Albania, began to disembark in Mikra Bay, on the eastern shore of the Gulf of Salonika, about six miles south of the city. It took over a sector west of the Vardar during the following month. Russian and Italian divisions arrived at the end of July and beginning of August. The Italian division occupied part of the Krusha Balkan, which formed the allied Front between Lake Butkova and Lake Doiran. It overlooked the Butkova Valley, facing the formidable Belashitza Mountains, which separated Bulgaria from Greece. The Russian brigades took over sectors from the French.

During this time the attitude of the Royal Hellenic Army, which was mobilized and which had surrendered to the Bulgarians the Rupel Pass and other strategical positions in Macedonia in the area east of the Struma, from the Gulf of Orfano northwards, constituted a standing menace to the Allies, who consequently insisted on its demobilization in July 1916. The right of the British line was then extended to Chai Aghazi, at the mouth of the Struma, previously occupied by Greek troops. Its left was also advanced to the south and west of Lake Doiran.

Preparations were then made for a combined offensive against the enemy's line from Doiran westwards. The attack took place on the 17th/18th August 1916 and resulted in the shortening of the allied line. The British, at the end of the month, extended their left to the left bank of the Vardar, just north of Smol.

In September 1916, during operations which were being conducted by the French and Serbians in the vicinity of Florina on the extreme left, the British on the Doiran-Vardar front kept up a constant bombardment of the enemy's lines, and attacked his positions on the 13th/14th of the month. But he strongly counter-attacked on the 14th and the troops then withdrew to their original line. Raids were made by the British at various points on this front during September.

The British troops were also actively engaged during August, September and October 1916 in the Struma Valley, especially in advance of Orliak, where the bridge on the road from Salonika to Seres crosses the river. The bridge head was enlarged after severe fighting amongst the villages on the left bank.

On the 29th November 1916 the Italian troops handed over the Krusha Balkan sector to the British, and the line of the latter was then continuous from the mouth of the Struma along the river valleys and the Tahinos-Butkova-Doiran Lakes to the Vardar river, a distance of approximately ninety miles. This line was held by the British Army with but few changes until the final stages of the campaign in Macedonia in 1918.

From the beginning of December 1916 to the end of February 1917, an infantry brigade was detached to occupy Katerini, in Thessaly, on the western shores of the Gulf of Salonika, at the foot of Mt. Olympus.

The 60th Division was added to the British Salonika Army from France in January 1917, but it left for Egypt in June of the same year. In August 1917, the 10th Division also left for Egypt.

But in the meantime a large addition was made to General Milne's command. The Greek revolution, which took place in August 1916 as a protest against handing over of Greek territory to the Bulgarian forces by garrisons of the Royal Hellenic Army, resulted in Greece joining actively in the war on the side of the Allies. Salonika became the seat of the Provisional Greek Government and a new volunteer army, called the Hellenic Army of National Defence, was then formed. A battalion of this new army joined the British on the Struma in September 1916, and eventually four divisions were raised. They were allotted to the Guevgeli sector of the line on the British left west of the Vardar.

In April and May 1917 a fierce battle was fought on the Doiran front by the XIIth Corps divisions. In March 1918 the Hellenic Army of National Defence had been greatly expanded, and the 1st Hellenic Division was attached to the XVIth Corps and took over the sector north of Lake Tahinos on the Struma. During the following month this division, with the British 27th and 28th Divisions, pushed forward and occupied villages in the Struma Valley after fierce fighting. In May and June of the same year two more divisions of the Hellenic Army were placed under General Milne's command as the Ist Hellenic Corps, which then took over the whole of the Struma Valley front, while the British line was extended to the Guevgeli sector, west of the Vardar. At this time the battalions of the British Divisions had been reduced from thirteen to ten, about 25 per cent. of the British infantry having been transferred to France.

Preparations were now made for the final advance. General Sarrail had been succeeded at the end of December 1917 as Commander-in-Chief of the Allied forces by General Guillaumot, who, however, left in June 1918, and General Franchet d' Esperey took his place. A new entrenched position, five to fifteen miles from the old front line, which had been commenced just a year earlier, was completed by September 1918. It ran from Berova, in the mountains about fifteen miles west of Lake Tahinos, and extended along the high ground through Lahana, on the Salonika-Seres road, to the hills round Janes and on to Vardino, between the Vardar and Lake Amatovo, north-west of Salonika.

The scheme of the final offensive was for Franco-Serbian forces to pierce the enemy's centre and roll up his left wing, while the British and Greek divisions on the right were to storm the positions between Doiran and the Vardar, and the Belashitza

positions across the Butkova from the Krusha Balkan. The general attack commenced in the morning of the 14th September 1918 along the whole of an eighty mile front from Lake Doiran to Monastir. On the 18th September, after four days' bombardment, the British XIIth Corps, under Lieut.-General Sir H. F. M. Wilson, consisting of the 22nd, 26th and 27th Divisions—the last west of the Vardar—with the 1st Hellenic Division, a regiment of French infantry and all the artillery of the troops under General Milne's command commenced its attack on the Doiran-Vardar front. Simultaneously the XVIth Corps, under Lieut.-General C. J. Briggs, consisting of the 28th Division, the Cretan Division of the Hellenic Corps, and the 228th Brigade, a brigade formed in Salonika of garrison battalions, crossed the Butkova without artillery preparation. The fighting on both these fronts was of the severest character on the three following days. The enemy held on to his main positions in the hills west of Doiran village, but on the 21st September the Franco-Serbian Army had turned his flank between Doiran and the Vardar, and a hurried retirement through the Kosturino Pass to Strumitza commenced. The trenches on the heights above Doiran were abandoned, and on the 22nd September 1918 the whole of the British Army moved forward. Yeomanry entered Bulgaria followed by the 26th Division and a Hellenic Division. The 22nd Division and the Cretan Division climbed the Belashitza Mountains, the former from the west and the latter from the east of Lake Doiran, while the 28th Division by forced marches from the British right, reached the Obasi heights west of the Lake.

On the 26th September the XVIth Corps, which had now taken over the 26th and 27th Divisions, leaving the 22nd and 28th Divisions with the XIIth Corps, entered the Strumitza Valley and reached the Strumitza-Petric road, north of the Belashitza range, while French, Hellenic and British troops stormed and captured the summits of the range which rose to a height of 4,000 feet above Lake Doiran.

On the 26th September Bulgaria asked for an armistice. The British advance, however, continued. The XIIth Corps swung eastwards towards the Rupel Pass and Demirhissar. On the 30th September, when the advanced troops were within fifteen miles of the Pass the Armistice was signed and hostilities ceased.

The British Army was then ordered to march through Bulgaria to Vidin on the Danube and co-operate with the French and Serbians in operations against Austria-Hungary. This

advance had scarcely begun when General Milne was ordered on the 10th October to command the Allied Forces operating against Turkey-in-Europe, and to transfer the British Salonika Army to that theatre of war. By the time the Armistice with Turkey was signed on the 30th October, the 22nd and 26th British Divisions and the 122nd French Division had reached the Maritza river, and the Ist Hellenic Corps Kavalla and Drama. The 27th and 28th Divisions were in Macedonia.

From the time the allied forces disembarked at Salonika, the military and medical situation was dominated by problems of road, rail and sea communications. There were no wide roadways through the old town of Salonika, except the road along the sea front, but a narrow street suitable for motor traffic ran through the centre of the town. The only roads out of it were one which ran westwards towards Monastir, and another north-east towards Seres. East of the old town there was the new town of Kalamaria with villa houses and fairly good streets. Between the old and new town lay the Greek barracks and parade ground. The new town and area east of it could only be approached from the Monastir and Seres roads through the narrow ill-paved streets of the old town or by the sea front. There was no road from Salonika across the neck of the Chalcidician Peninsula to Stavros, but a fairly good road went from the new town by way of Sedes towards Vassilika, a village about twelve miles south-east of Salonika. Beyond Vassilika there were only mountain tracks. The only other road in the vicinity of Salonika was a road that branched eastwards from the Seres road just north of the city to Kirechkoi, the headquarters of the XVIth Corps, and Hortajkoi, a village nestling high up in the mountains on the north-west slope of the Hortaj mountain range, the highest point of which, Kotos, was close on 4,000 feet above sea level. In all other directions communication was by mountain tracks and paths only suitable for pack transport. Railway communications were single track lines connecting Salonika westwards with Vodena, Florina and Monastir, northwards along the Vardar Valley with Uskub and Nish in Serbia, and eastwards by way of Lake Doiran and Seres with Constantinople. All these lines had their terminus on the west of Salonika. The Constantinople line ran north to Doiran before turning eastwards. It was the line on which the British had to depend when the 10th Division was on the Doiran-Kosturino front, and during its extrication from Serbia. There was no suitable road for wheeled traffic connecting Salonika with Doiran, but

from Doiran railway station a rough road suitable for motor traffic ran round the west of the Lake through Doiran Village towards Kosturino.

The country generally may be described as a series of marshes, mountains, lakes and villages. Salonika itself is built on a steep slope rising from the sea front. On the east of it the ground is more open, and there are fairly wide and gentle slopes beyond the new town between the east of the harbour and the village of Sedes on the Vassilika road. There was

The sea front at Salonika.

very little marshy ground on this side of the town, but on the west of Salonika the country between the Monastir road and the sea is a wide extent of marsh formed by the Galiko river and the delta of the Vardar. North of the road the ground rises gently in open slopes towards a range of higher hills. The site of the general hospitals was selected originally on these open slopes, near a village, Dudular, some four miles west of Salonika.

Immediately north of Salonika and of the more open country east and west of it there is a range of mountains, the Derbend range, across the neck of the Chalcidician Peninsula

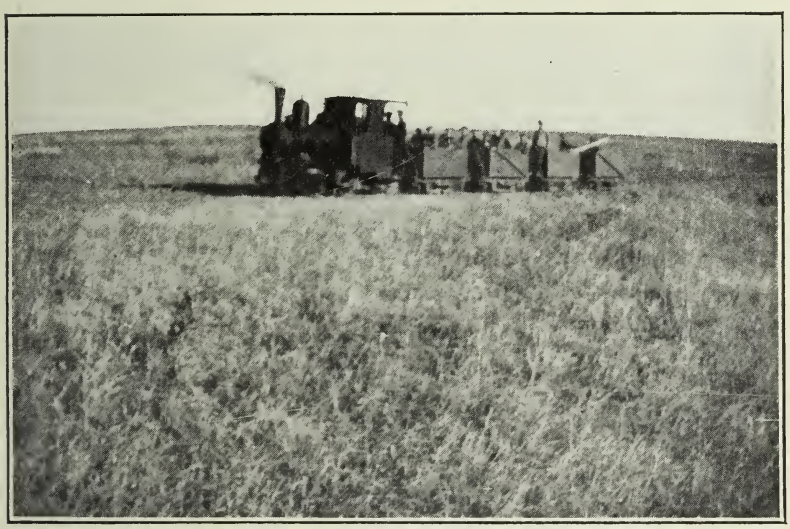
from Stavros on the extreme east to the Galiko river. The Salonika entrenched positions ran along the northern slopes of this range. The Seres road passed northwards over it, at a pass known as the Derbend Pass, to a village, Aijvatli, and then descended to a plain, which marked the western extremity of the long expanse of Lakes Beshik and Langhaza. After it leaves the Langhaza plain, it crosses the Krusha Balkan in an easterly direction by the villages of Likovan and Lahana and descends somewhat abruptly to the Struma, which it crosses by a bridge near Orliak, some five miles north-west of Lake Tahinos, and ten miles from the town of Seres. The shores, and especially the eastern and western extremities of the lakes, were marshy. To the north of the Beshik and Langhaza lakes and plain the country is mountainous and forms the Krusha Balkan. It is bounded on the east by Lake Tahinos, which extends from the Gulf of Orfano for some twenty miles in a north-westerly direction to the Struma river and valley. The Struma Valley, Butkova Lake, Butkova Valley and Doiran Lake form a semi-circle from Lake Tahinos round the north of the Krusha Balkan and separate it from the high mountains of the Belashitza range. The whole of this encircling lake and river valley is intensely malarious.

The whole of this country is only sparsely wooded. Springs abound in many places in the mountains and on their slopes. In the Langhaza plain, at the village of Langhaza, and at Loutra on the Sedes-Vassilika road there are hot sulphur and mineral springs, in connection with which there were bathing establishments.

The climate was similar to that of the Dardanelles and Eastern Europe, but the cold of winter was apt to become intense during blizzards which came down the Vardar Valley in the winter months. The Vardar wind also caused disagreeable dust storms. Fogs were frequent in Salonika and its harbour, along the valleys and on the mountains. The summer heat, especially in the mountains, was never very oppressive.

The road communications were unsuitable for motor ambulance transport, except along the Monastir road, the road to Sedes in the direction of Vassilika, the road through Kirechkoi to Hortajkoi, the Seres road at any rate as far as Lahana, and the branch road from it to Langhaza village. Motor transport could also be employed along the road from Doiran railway station northwards towards the position occupied in 1915 by the 10th Division. As time went on the roads were improved and new roads constructed, the most important for medical

services being one from the Hortajkoi plateau to Kapudzilar and the open sites on the east of the harbour. It was open for motor traffic by April 1916. When the army left the entrenched camp and advanced to the Struma Valley and the Doiran front, the Seres road was improved throughout its length to the Struma, and a road communication between Stavros along the southern slopes of Lakes Beshik and Langhaza to join the Langhaza and Seres road was made suitable in dry weather for motors. The track to Doiran from the Monastir road was also made fit for motor traffic, and a cross road from



Decauville train, Doiran front.

it to the Seres road was constructed north of the Derbend range from Salmanli on the Doiran railway line to a point south of Guvesne. Roads were also made from the Lembet area on the Seres road north of Salonika to the entrenched positions on the north of the Derbend range, through Akbunar to Daudli and Dzuma, where connection was made with the Doiran road, through Arapi Vysi to Balza, and to Jazladzik north-east of Lembet. Roads also led from Kirechkoi to Jazladzik and Tumba at the west end of the Langhaza Lake and from the Hortajkoi plateau to Ajvasil on the lake and to Langavuk between the Langhaza and Beshik Lakes.

Railway communications were also established in various directions. A broad gauge line was constructed from the main

line west of Salonika northwards to the Lembet area. A broad gauge line was also eventually constructed north of the Derbend range from Salmanli, on the Doiran railway eastwards to Guvesne, to within a short distance from which point a Decauville line had been laid from Stavros along the southern shores of Lakes Beshik and Langhaza. The terminus of this line from Stavros was at Sarakli. Decauville lines were also constructed for short sections in various other directions. In the Struma Valley one ran up the valley from Orliak to Kopriva, and another down the valley from Orliak to Komarjan. A Decauville line was also constructed from near Likovan, on the Seres road, to Mirova, on the southern slopes of the Krusha Balkan. A line ran from Sarigol and Kukus, on the Doiran railway, northwards into the Krusha Balkan, to Snevce, where aerial railways joined it from the advanced posts on the Krusha Balkan heights. Janes, on the Doiran-Salonika line, and Mihalova Station, on the Kilindir-Karasouli railway line, were also connected by a Decauville line.

Sea communication for evacuation of sick and wounded was by hospital ships from Salonika to Malta. Stavros had also to be evacuated by sea to Salonika until road or rail communication became possible. The sea communication, however, between Salonika and Malta ceased for a time during active submarine warfare. A new route of evacuation was then established from Salonika by the Thessaly railway to Bralo and thence by road to Itea, on the Gulf of Corinth. From Itea the journey was by sea to Taranto, where it joined the Mediterranean Line of Communication with France.

But it was only in the later stages of the war that all these road and railway communications were available, and throughout the campaign the zones of evacuation had to be planned for different forms of ambulance transport.

CHAPTER III.

THE MEDICAL SITUATION ON THE MACEDONIAN FRONT.

THE administrative medical services at the time when the 10th Division disembarked at Salonika were represented by an A.D.M.S. of the Base, Lieut-Colonel J. C. Connor, R.A.M.C., with a D.A.D.M.S. and an A.D.M.S. for Sanitation, Lieut.-Colonel G. E. F. Stammers. This last officer had been left in Salonika by Surg.-General Babtie who, before the troops landed, had made a medical and sanitary reconnaissance from Mudros, as P.D.M.S. of the Mediterranean. Surg.-General W. G. Macpherson was appointed D.M.S. of the Force in November 1915 from the appointment of D.M.S. of the First Army in France, and arrived in Salonika on 25th November, accompanied by Lieut.-Colonel E. T. F. Birrell as his A.D.M.S., Colonel Sutton as D.D.M.S., L.of C., and Lieut.-Colonel T. Crisp English as Consulting Surgeon. A Consulting Surgeon from Malta, Colonel W. Thorburn, was already in Salonika, and the D.M.S. appointed him Consulting Surgeon to the base hospitals, while Colonel English acted as Consulting Surgeon to the casualty clearing stations and field medical units, of the work in which he had had special experience in France. Two D.A.Ds.M.S. on Colonel Sutton's staff, one for Sanitation, also accompanied the D.M.S. The 10th Division was then in Serbia and one of the first administrative duties was to prepare a system of evacuation of sick and wounded and medical units during the withdrawal from Serbia, and generally to organize the medical services of the Force. The divisions arrived incomplete as regards their medical units owing to personnel and equipment having been embarked on different transports at Marseilles. The 27th Division arrived without any administrative or headquarters staff, who did not join it until 9th January 1916. The field ambulance transport had to be reconstituted for warfare in a country which was mountainous and possessed only a few roads suitable for wheeled transport. Gradually a definite line of evacuation to hospital centres at the base was established for the entrenched camp from Stavros along the lakes and Derbend hills to the Galiko river.

The divisions from France arrived as the XIIth Corps, with Colonel N. C. Ferguson as D.D.M.S. The XVIth Corps had not yet been formed.

As there appeared to be no immediate prospect of an advance from the entrenched camp, the D.M.S., with the approval of the Army Commander, amalgamated the staff of the D.D.M.S., L. of C., with that of A.D.M.S., Base, leaving the latter to administer the services in Salonika town and be responsible under the D.D.M.S. for town sanitation and embarkation duties. This change in administration was all the more necessary as the appointment of an Inspector-General of Communications was abolished in February 1916, the G.O.C. Base and L. of C. Command being merged into one.

When the XVIth Corps was formed in January 1916, Colonel M. P. C. Holt was appointed D.D.M.S. from A.D.M.S., 22nd Division. The divisions and corps were then administered as follows :—

XIIth Corps	D.D.M.S.	Colonel N. C. Ferguson.
22nd Division	A.D.M.S.	Colonel H. D. Rowan.
26th Division	,,	Colonel F. S. Penny.
28th Division	,,	Colonel N. Tyacke.
XVIth Corps	D.D.M.S.	Colonel M. P. C. Holt.
10th Division	A.D.M.S.	Lieut.-Colonel M. Boyle.
27th Division	,,	Colonel F. Smith.

Several changes subsequently took place in the administration of the medical services. Surg.-General W. G. Macpherson was transferred to G.H.Q., France, at the end of March 1916, his place as D.M.S. being taken by Surg.-General H. R. Whitehead, from Malta. Lieut.-Colonel Stammers, A.D.M.S. for Sanitation, was transferred to Egypt in February 1916, and replaced temporarily by Captain W. R. Galwey, and in April by Lieut.-Colonel A. R. Aldridge. Captain Galwey eventually was appointed for a short time as liaison officer with the French, but remained on the D.M.S. staff.

With the advance of the troops from the entrenched camp in May 1916, the appointment of an I.G.C. was restored, and the offices of the D.D.M.S., L. of C., and A.D.M.S., Base, again separated. A.Ds.M.S. for Sanitation were sanctioned on the headquarters of each of the two corps. Various changes were also made in the administrative medical officers of corps and divisions after the outbreak of malaria in the summer of 1916, chiefly owing to officers having to be invalided on account of sickness. Colonel G. T. Rawnsley then became D.D.M.S. of the XIIth Corps. In May 1917 Colonel Sutton

Sketch Map showing the Medical Arrangements for collection and evacuation of sick and wounded from the entrenched camp at SALONIKA, February, 1916.

Scale 1/66.666

Metres 1000 500 0 1 2 3 4 5 6 7 Kilometres

Guvezne
Salihli
Jenikoj
Gnojna
Langaza
Langaza Dere
LANGAZA LAKE
Ajvasil
587 DEVE KRAN
Rahmanli
Garibce
Guvezne Dere
Kavalar
Tumba
Dremiglava
Kamara
Stanovón
Lajna
Kuru Dere
Ajvatli
To Hortackoj 2 kilos
Adamia
BEAR TAS
Baldza
Jajladzik
Daudli
Daudli Sogir
Pirnar
Kireckoj
KIRECKOJ BAG
Orendzik
Dzuma
Red House
Akbunar
DAUTBABA
TWO PEAKS
Lembet
Dautbali
Nares
Karaissi
Barracks
Kapudzilar
Jenikoj
Gradobor
River Galiko
Harmankoj
Kalamaria
SALONIKA
White Tower
Tramway Depot
Uchantar
Dudular
MILITARY STA
A
B

Metalled roads
Unmetalled "
Tracks
Railways
Heights in metres

Regtl aid post
Advanced dressing station
Ambulance wagon rondezvous
Motor Ambulance car "
Main dressing station
Casualty clearing "
Motor Ambulance convoy
Stationary Hospital
General Hospital centres
A Old centre
B New "
Roads and tracks for hand or pack transport
" for Ambulance wagon "
" " " Motor car "

was transferred for duty in England as Officer Commanding the R.A.M.C. Training Centre. He was succeeded as D.D.M.S., L. of C. and Base, by Colonel M. P. C. Holt, whose appointment as D.D.M.S., XVIth Corps, was given to Colonel F. Smith, from the 27th Division. In July 1917 the War Office approved a reorganization of the medical administrative staff of the Salonika Army, granting a D.A.D.M.S. (Captain Galwey) to the staff of the D.M.S., two A.Ds.M.S., (one for the west area and one for the east area of the Base), and three D.A.Ds.M.S. to the staff of the D.D.M.S., Base and L. of C.

In September 1917 Surg.-General H. R. Whitehead was invalided, and Colonel M. P. C. Holt, with the temporary rank of Surg.-General, was appointed in his place. Lieut.-Colonel H. J. M. Buist, who had been A.D.M.S. of the west area of the Base and L. of C. then became the D.D.M.S., L. of C. He was not replaced in the west area, and the administrative medical duties of the Base and L. of C. were then carried out under the D.D.M.S. by one A.D.M.S. for the Base, an A.D.M.S. for Sanitation, and four D.A.Ds.M.S., of whom one was a Quartermaster, R.A.M.C.

In January 1918 Lieut.-Colonel E. T. F. Birrell, who had been A.D.M.S. at G.H.Q. since his arrival, became D.D.M.S. of the XVIth Corps, on Colonel F. Smith being retired by age. He was succeeded by Colonel C. B. Martin.

Organization of Ambulance Transport.

During the various actions and battles on the British front in Macedonia, the medical arrangements depended chiefly on the nature of the means of evacuation and the routes along which the sick and wounded were brought to the hospital centres at the base.

In the mountains only hand or pack animal transport could be employed. Whenever the tracks opened out there was an area in which horsed ambulance wagons could be employed to bring wounded to the roads suitable for motor ambulance transport. This situation is illustrated in the map of the general system of evacuation from the British entrenched position round Salonika in the early months of 1916.

When the field ambulances arrived with their divisions they had no pack transport, and one of the first steps taken by the D.M.S. was to initiate measures for providing suitable transport. Various improvised methods were suggested by him to the A.Ds.M.S. of divisions. An exhibition of the types of transport

for hill warfare as devised in the divisions was subsequently held in January 1916. The exhibits were interesting and ingenious.

Programme of Exhibits.

1.	*Travois.*	
	(*a*) Travois, (patient lying)	No. 78 F.A. : (2 exhibits)
	Drawn by one mule.	No. 79 F.A. 28th Div.
	(*b*) Travois (between 2 mules)	No. 66 F.A.
2.	*Wheeled Stretchers.*	
	(*a*) Drawn by one mule	No. 78 F.A., No. 79 F.A., No. 66 F.A., No. 68 F.A. (2 exhibits).
	(*b*) Single wheel stretcher carrier (folding)	28th Division.
	(*c*) Furber pattern	No. 78 F.A.
3.	*Stretchers.*	
	(*a*) Net stretcher	28th Division.
	(*b*) Stretcher for carriage	No. 67 F.A.
	(*c*) Model of stretcher for pack mule ..	27th Division
4.	Improvised Litter	28th Division.
5.	Sleighs	No. 67 F.A., No. 68 F.A., No. 66 F.A.
6.	Stretcher on pack mule	No. 78 F.A., 28th Div., No. 66 F.A.
7.	Adaptation of limber wagons for carriage of wounded	No. 78 F.A. (2 methods), No. 66 F.A.
8.	Adaptation of G.S. wagons for carriage of stretchers	No. 66 F.A.
9.	Maltese cart adapted for 2 stretchers and 2 patients lying	No. 66 F.A.

As a result of the demonstration and tests, it was decided to employ travois and litters for the lying down cases wherever pack transport could be used ; and stretchers carried by hand or on wheeled stretcher carriers, where pack transport was unsuitable. An establishment of 120 ambulance pack mules with cacolets had been authorized for each field ambulance, but as cacolets were only suitable for sitting up cases, the D.M.S. arranged for sixty to carry cacolets, twenty for twenty travois, and forty for twenty litters, which required two mules each. The mounted brigade field ambulances had 100 ambulance pack mules allotted to each, fifty were equipped for cacolets, eighteen for travois, and thirty-two for litters. But not many of the mules were capable of carrying a loaded pair of cacolets, and it was decided to select only thirty of the strongest of the field ambulance mules and twenty of the mounted brigade field ambulance mules as cacolet mules, and use the remainder as riding mules, thus reducing to a

considerable extent the carrying capacity of the ambulance pack transport with each field ambulance. It was thought possible, however, that the mule drawing a travois could also carry one patient on a riding saddle, so that the carrying capacity was only very slightly diminished.

The cacolets were the standard pattern provided by the Ordnance Department, but those sent out at first did not fit the pack saddles and alterations had to be made before they

Putting wounded on travois, Macedonia.

could be used. Mules also arrived without personnel, and for a time those drawn by the field ambulances had to be placed in charge of R.A.M.C. men of the bearer divisions. It was fortunate, therefore, that during the period when mules were being trained as ambulance mules with their field ambulances no active hostilities were taking place. The travois and litters were made locally from ash or chestnut wood, with forgings and fittings prepared by the Ordnance Department. They were put together by the field ambulance personnel. A modified pack saddlery for use with travois and litters was also designed.

The final result of the reorganization of the ambulance transport of a field ambulance of the Salonika force as proposed by the D.M.S. in February 1916 was as follows :—

60 cacolet mules
60 mules for travois or litters
6 wheeled stretcher carriers
12 mono-wheel stretcher carriers
50 stretchers in addition to the normal equipment
3 motor ambulance cars
3 light ambulance wagons.

Ambulance cars had accompanied the field ambulances of the 10th, 22nd and 28th Divisions to Salonika. Consequently when it was decided to allow only three instead of seven to each field ambulance, the surplus cars were distributed for use with general and stationary hospitals, depôts of medical and surgical stores and embarkation.

The field ambulances were thus organized to accompany formations with pack transport in order of march as follows :—

Bearer Division.

60 mules with pairs of cacolets
15 ,, ,, travois
6 ,, ,, 3 double litters
6 ,, ,, wheeled stretchers
27 ,, ,, saddles for riding
5 ,, spare
2 ,, with water tanks.

Tent Division.

12 mules with equipment
2 ,, ,, cooking equipment } "A" Section
1 ,, ,, mess equipment
12 mules with equipment "B" Section
12 mules with equipment
5 ,, spare } "C" Section
2 ,, with water tanks

Train.

2 mules with officers' baggage
6 ,, ,, medical comforts and rations for casualties
10 ,, ,, rations for personnel
16 ,, ,, forage
5 ,, spare
2 ,, with water tanks
2 ,, ,, for farriers.

The field ambulance had thus 210 pack mules in place of the wheeled transport. The horsed ambulance wagons of the unit were parked in reserve.

The Motor Ambulance Convoys.

Only one motor ambulance convoy, No. 17, disembarked in Salonika in 1915. Unfortunately the ambulance cars had been placed on a transport, in England, without the personnel of the

convoy. They arrived in Salonika on the 5th November 1915 with only one N.C.O. and six men in charge. The remainder of the personnel and officer in charge of the workshop did not arrive till the 26th November. The cars were parked on the Monastir road and appear to have been used without any control, so much so, that when the personnel arrived only two were in running order, although all the fifty embarked at Avonmouth in perfect condition. They had been left exposed to the blizzard which commenced on the 26th November. Twelve were missing altogether, fourteen had cracked cylinders, and the others had minor damages. The primary cause of this was the fact that the vehicles and the commanding officer and personnel did not arrive together, and at that time the only administrative medical officers in Salonika were an A.D.M.S. and D.A.D.M.S. on duty at the Base, and an A.D.M.S. for Sanitation. The convoy itself had been parked near a mechanical transport company of the A.S.C.

Two convoys, Nos. 9 and 7, arrived from France early in January 1916, two more, Nos. 32 and 34, from England in September and November 1916 respectively, and one, No. 38, at the end of May 1917.

Forty-four motor ambulance cars were withdrawn from the Salonika Force to be sent to Egypt, and this led to a considerable amount of difficulty when extra cars were required during the battles.

The Ambulance Trains.

Two ambulance train units, Nos. 41 and 42, arrived towards the end of December 1915 from England. They were similar in organization to the units mobilized at the beginning of the war for the British Expeditionary Force which went to France; that is to say they took with them Brechot-Desprez-Ameline frames and stretchers for use in covered trucks. They were not used, however, for a considerable time and remained parked near the Monastir road. Two Greek ambulance trains of ten covered trucks each, fitted with Linxweiler frames and stretchers were based on Salonika, and one was placed at the disposal of the British Force. One or two of these trucks were attached to the trains running to Doiran during the time the 10th Division was in Serbia, and similar arrangements were made for bringing sick from the entrenched camp positions on the British left by railway from Naresh Station on the Galiko river until the advance of 1916. No new ambulance train units were sent to Salonika until March 1918, when Nos. 52 and 53 arrived.

The assembling of an ambulance train was commenced for the first time on the 2nd June 1916. It was to consist of twenty-four coaches, namely, a kitchen truck fitted with Soyer's stoves and a 60-gallon water tank; one store and ration truck; one composite passenger coach for officers, nurses and office; one composite coach for personnel; ten Greek ambulance vans with the Linxweiler fittings removed and the Brechot fittings put in their place, increasing the carrying capacity of each truck from eight to twelve; and ten passenger coaches for sitting cases.

The Casualty Clearing Stations.

Five casualty clearing stations, No. 25 from the Dardanelles with the 10th Division, Nos. 27, 28, 31 and 40 from France and eventually No. 35 with the 60th Division, joined the Salonika Force. Their distribution in connection with the evacuation of sick and wounded may be gathered from the description of the lines of evacuation and the operations on the Doiran and Struma fronts. No. 35 was transferred to Egypt in June 1917.

Evacuation of sick and wounded from the entrenched camp positions in 1915-16.

There were no active hostilities after the withdrawal from Serbia until the advance to the Doiran and Struma fronts in the summer of 1916; but the D.M.S. prepared a scheme for evacuation of sick and wounded from the entrenched camp and had his casualty clearing stations and ambulance transport distributed to conform with the military situation. No. 28 C.C.S. had disembarked immediately after the withdrawal from Serbia, but without equipment. It was camped temporarily in the Monastir road area until the arrival of its stores and equipment a month later. It was then moved to a site on the Sedes-Vassilika road, about nine miles east of Salonika, to work in association with the base reinforcement camps, which had moved there from the area west of Salonika.

Nos. 25 and 27 C.C.Ss. were moved to the Seres road, in the Lembet area, and opened at the junction with the Seres road of a new road that was being constructed towards Akbunar and the positions in the Derbend hills between the Galiko river and the Seres road. A broad gauge railway line was also being constructed from the main line near the hospital centre on the Monastir road to this point.

No. 31 C.C.S. was retained on its original site on the Monastir road near the military railway station.

No. 40 C.C.S. was moved to a site on the Hortajkoi road, near the Hortajkoi plateau.

Of the three motor ambulance convoys, No. 17 was retained in the western area on the Monastir road, No. 9 was moved to the Seres road in the Lembet area, and No. 7, on arrival, was stationed on the Sedes road in the eastern area.

General view of hospital on the Hortajkoi Plateau.

Clearing sick and wounded from the entrenched camp positions depended on five main lines of evacuation:—

(1) By the Doiran-Salonika railway.
(2) By the Seres-Salonika road.
(3) By the Langhaza Lake road.
(4) By the Hortajkoi-Kirechkoi-Salonika road.
(5) By hospital ship from Stavros.

Patients coming to the base by the railway were received into No. 31 C.C.S., near the military station. Those for evacuation by the Seres-Salonika road, and also by the Langhaza Lake road, were brought to Nos. 25 and 27 C.C.S., at the junction of the Akbunar and Seres roads by divisional transport. The Hortajkoi-Kirechkoi road was used for evacuation to No. 40

C.C.S. Sick from the camps in the western or Monastir road area were brought to No. 31 C.C.S. When the base depôt camps were moved from the Monastir road area to the Salonika-Sedes road, No. 28 C.C.S. received their sick. Each division used hand carriage, mule transport, horse ambulance wagons and motor ambulance cars, according to the nature of the country and roads, and was provided with all these means of ambulance transport for bringing patients to the casualty clearing stations. The motor ambulance convoys were employed in evacuating from the casualty clearing stations to hospitals at the base.

A field ambulance at Stavros.

Stavros was at that time cut off from communication with Salonika by land. The field ambulance of the 10th Division, which went there, supplied the hospital requirements of the troops, supplemented by additional equipment and comforts. Patients requiring hospital treatment at the base were brought to Salonika as required by hospital ship.

Lines of Evacuation from the Doiran and Struma Fronts.

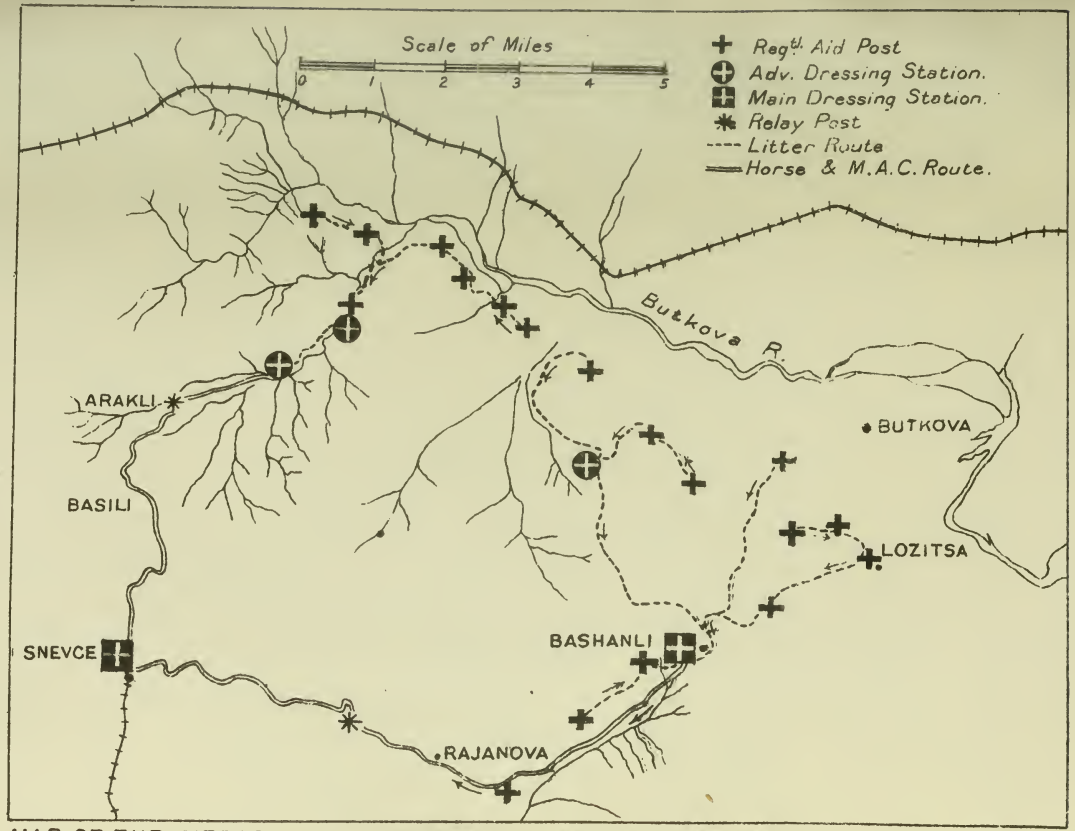
When the advance from the entrenched camp took place casualty clearing stations were allotted to corps areas. Nos. 28 and 31 went to forward positions in the XIIth Corps area.

No. 28 C.C.S. went at first to Janes, in August 1916, but shortly afterwards to Karasouli, on the Vardar Valley railway line, near Lake Ardzan, where it remained till November 1917, when it was transferred again to Janes, till March 1918. It was then established at Orcovica, in the hills about three or four miles north of Karasouli, and remained there till the final operations in September. No. 31 C.C.S. went to Janes, in August 1916, and remained there until after the final operations of 1918, acting as railhead casualty clearing station for the XIIth Corps, on the Doiran front. Nos. 27 and 40 C.C.Ss. were transferred to the XVIth Corps area. The former had been moved from its position near No. 25, at the junction of the Seres and Akbunar roads, in May 1916, to a site on the latter road about one and a half miles south of Akbunar. At the beginning of July 1916 it was again moved and sent to Lahana, on the Seres road, where it remained until after the final operations in 1918. No. 40 C.C.S. was moved from its site on the Kirechkoi-Hortajkoi road, in June 1916, to Guvesne on the Seres road, but after November of that year occupied positions near Orliak, in the foothills overlooking the Struma Valley. At the end of June 1918 it was transferred to the XIIth Corps area on the extreme British left, and opened for the final operations near Gumendje Station, on the right bank of the Vardar, where the railway crossed the river from Karasouli. No. 25 C.C.S. remained at the junction of the Akbunar-Seres road, which was railhead of the new broad gauge railway line, until the branch broad gauge line had been constructed from Salmanli to the Seres road at Guvesne. No. 25 C.C.S. was then moved up to Guvesne in November 1916, setting free No. 40 C.C.S. to move forward to its new position near Orliak. It left a small detachment on its original site. This detachment rejoined headquarters in August 1917. Detachments of No. 25 C.C.S. were also sent early in 1918 to form small posts at Ajvasil on Lake Langhaza, Langavuk and Gamonic along the road to Stavros; and, later on in 1918, to Sarakli, the terminus of the Stavros line; to Ekaterini, in Thessaly; and to a forward position on the Seres road. The positions of these posts varied from time to time. They were intended to form links along the routes of evacuation to railhead. In preparation for the final operations No. 25 C.C.S. sent a large detachment of 50 beds and provision for 200 casualties to Snevce, the XVIth Corps railhead in the Krusha Balkan, and another to Sarigol, behind the XIIth Corps, on the Galiko river.

When the 60th Division arrived from France at the end of 1916, it was accompanied by No. 35 C.C.S. After completing its equipment to form a hospital for 300 beds this unit was established near the railway station at Sarigol and remained there as the C.C.S. to which sick and wounded from the Krusha Balkan were brought by the Decauville line from Snevce. It thus acted as a railhead evacuation unit for that area in the same manner as No. 25 C.C.S. at Guvesne, on the Seres road, for the line of evacuation from the Struma Valley, and No. 31 C.C.S., at Janes, for the line of evacuation from the Doiran front. It left with the 60th Division for Egypt in June 1917. Its position at Sarigol was then taken by a stationary hospital.

The motor ambulance convoys on the advance to the Struma and Doiran fronts from the entrenched camp were also distributed to conform with the new strategical situation. No. 7 M.A.C. was transferred in June 1916 from the Sedes road to Guvesne, and was employed in road evacuation from the Struma front to railhead. It sent a detachment to Snevce in November 1916 to evacuate field ambulances of the 28th Division in the Krusha Balkan to No. 31 C.C.S. at Janes, or No. 35 C.C.S. at Sarigol. In December 1916 the headquarters of the convoy was moved up to Lahana, and the Snevce detachment rejoined it there. In June 1917 a section was sent to Mirova, on the Lahana-Paprat road, to work towards the positions near the Butkova Lake. In July 1918 a section was sent to Karasouli for duty with the XIIth Corps, the whole unit joining the corps at Karasouli on 25th September 1918, during the final operations.

No. 9 M.A.C. remained on the Monastir road, west of Salonika, as a base convoy until September 1916. Its cars were distributed for various duties, such as reinforcing the work of No. 7 M.A.C. on the Seres road, providing a section for duty in the Eastern (Kalamaria) area, after No. 7 was transferred to Guvesne, and doing general work at the base, in connection with carrying patients to the quay for embarkation, and in distributing the sick to the hospitals. In September 1916 the headquarters of the convoy moved to Kalamaria. In April 1917 a section went by road to Stavros as an experiment. Leaving at 7 a.m. it arrived at 4.30 p.m. and returned with sixty-five patients the following day, taking a quarter of an hour less on the return journey. Although several of the patients were serious cases they all arrived at No. 1 Canadian Stationary Hospital at Lembet in good condition. They were



MAP OF THE MEDICAL ARRANGEMENTS AND ROUTES OF EVACUATION OF A BRIGADE AREA IN THE KRUSHA BALKAN, AUGUST – SEPTEMBER, 1917.

Malby & Sons Lith.

fed and attended to at posts *en route*. The experiment thus proved the possibility of evacuating sick from Stavros by road, at any rate in dry weather, and the convoy subsequently continued to evacuate patients by this route. The convoy was also actively employed during the Salonika fire of August 1917 in transferring the civil population, victims of the fire, to places of safety.

No. 17 M.A.C. was attached to the XIIth Corps, and had its headquarters at Janes after the corps advanced to the Doiran front; but its cars were frequently widely distributed to various localities in the XIIth Corps area on that front. The headquarters, however, remained throughout at Janes.

No. 32 M.A.C., which arrived at Salonika on 12th September 1916, was placed on the Akbunar road at first, and in March 1917 near Karaissi, on the Salonika-Kirechkoi road, owing to air raids on the former position. It was employed in general ambulance duty in the Lembet and Base areas, and in road evacuation from Guvesne to the Base.

No. 34 M.A.C. arrived on 2nd November 1916 and was sent to the XVIth Corps area on the 28th of the month. It was employed there in the most advanced section of the Seres road in evacuating from field ambulances in the Struma Valley to No. 40 C.C.S., and also in clearing from field ambulances at Snevce to No. 31 C.C.S. at Janes. The roads were much cut up and the work of the convoy was particularly difficult. During the winter of 1916-17 several of the cars stuck in the snow and mud. From time to time evacuation had on this account to be suspended. In April 1917, No. 34 M.A.C. was employed in clearing from No. 40 C.C.S. to No. 27 C.C.S. at Lahana, and cars from it were placed at the disposal of A.Ds.M.S. of the XVIth Corps divisions. The Snevce detachment rejoined in July 1917 and in August a section was detached to Mirova to evacuate from Paprat to the Mirova railhead. In April 1918 cars were also placed at the disposal of the A.D.M.S. of the Greek Division, and in June of that year the convoy worked entirely with the Greek Corps, in the Struma Valley, as there were no motor ambulance cars with the Greek troops until the Greek Corps had obtained its own motor ambulance convoy in September. No. 34 M.A.C. was transferred to the XIIth Corps on 24th September 1918 after working in the Snevce area during the final operations.

No. 38 M.A.C. began to arrive in Salonika on 30th May 1917 but the complete unit had not assembled till 26th June 1917. During the remainder of the year it was employed on routine

duties at the base, more especially in distributing sick and wounded to hospitals and convalescent depôts on the Hortajkoi plateau. It was situated on the Akbunar road. A section, however, was attached to No. 17 M.A.C. and was placed at Snevce for clearing the Bashanli-Snevce area. In January 1918 much damage was caused to the cars of this convoy by frost, especially during work along the Hortajkoi, Beshik and Langavuk roads. The section from Snevce rejoined in April 1918, and cars were then distributed to various detached posts

Canadian General Hospital in Kalamaria.

east and west of Salonika. The work of the convoy appears to have been very varied and carried out mainly by small numbers of cars detailed to various units and posts.

The Hospitals and Convalescent Depôts.

The first hospital unit to arrive in Salonika was the New Zealand Stationary Hospital. It disembarked from Egypt in November 1915, and was followed shortly afterwards by No. 4 Canadian General Hospital. The New Zealand unit opened on a low plateau at Lembet and the Canadian unit north of, and close to, the Monastir Road, about three and a half miles west of Salonika in the direction of the village of Dudular.

These were the only hospitals fully established at the time when the 10th Division was in Serbia in 1915, but a British general hospital, No. 28, which arrived in the middle of November from England, was being established on a site a few hundred yards north of No. 4 Canadian. No. 29 General Hospital arrived a month later and took up a site to the east of No. 28. All these hospitals were under canvas. Their chief difficulty was want of approach roads, especially in the case of Nos. 28 and 29, which were some distance from the main road.

Officers' ward in a hutted general hospital, Salonika.

Patients and material for a long time had to be man-handled from the Monastir road to the hospital sites, a distance approximately of 1,000 yards.

The Monastir road area had been selected as the site for base hospitals at the time of Surg.-General Babtie's reconnaissance in October 1915. Its selection was determined by the fact that the railway line from the Serbian front passed close to it, but it was in the vicinity of malarial marshes and, as large ordnance and other depôts of war-like material were opened near it, the enemy aircraft, which frequently bombed the entrenched camp, was not likely to spare the hospitals. These

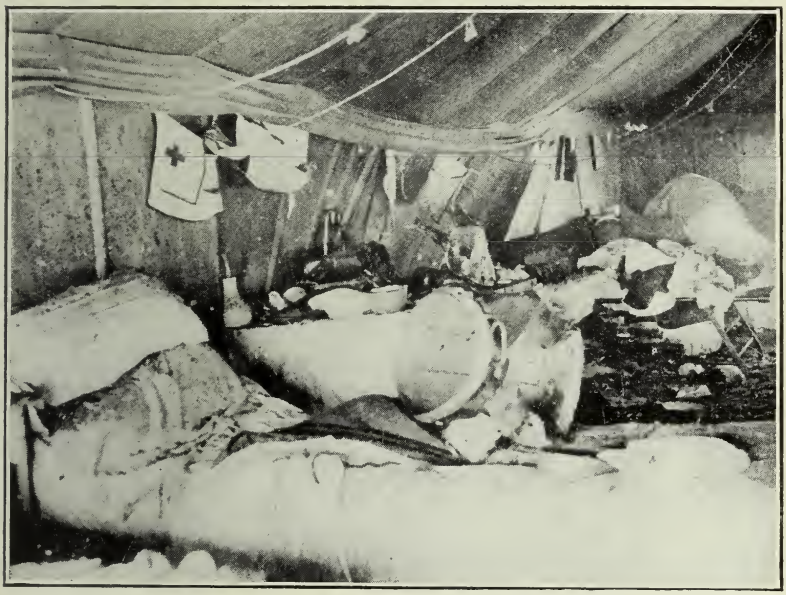
and other considerations, such as the French taking over the Monastir road area, led the D.M.S. on his arrival in Salonika at the end of November to select a new hospital site on the open slopes east of the bay in what was known as the Kalamaria area. The disadvantages of the new site were the absence of any water supply and the fact that it was at some distance from the railway line, and that the approach to it from the entrenched camp positions was through the town. Its chief

Tent of No. 29 General Hospital at Salonika wrecked by aircraft. The photograph shows the small tear caused by the entrance of the bomb into the tent.

advantages were that it was away from the area likely to be bombed, and also from the marshes, and it was consequently much more suitable as a hospital site from a sanitary point of view. The water supply problem was overcome by sinking tube wells, and the difficulty of approach was met when new roads connecting Kalamaria with the Hortajkoi plateau and the Kirechkoi road by way of the village of Kapudzilar had been constructed. The proximity to the railway line was not of great importance after the entrenched camp was occupied, as only troops on the extreme left of the British line could make use of the railway.

Consequently, steps were taken early in 1916 to prepare hutted camps for four general hospitals on the new site. The huts were to come from England or Mudros, but steps were taken to erect the huts of one hospital by local contract in anticipation of the arrival of the huts from overseas.

No. 5 Canadian General Hospital arrived in Salonika towards the end of December and opened under canvas on the new site, pending the erection of the huts. No. 4 Canadian General Hospital was moved from the Monastir road to the new huts towards the end of May 1916.



Ward of No. 29 General Hospital at Salonika wrecked by aircraft.

These four general hospitals, Nos. 4 and 5 Canadian and Nos. 28 and 29 British, were then the only general hospitals with the Salonika force before the advance from the entrenched camp. When the advance took place in May the huts for Nos. 28 and 29 General Hospitals were not ready, and the necessity for retaining hospitals on the Monastir road site, in consequence then of the more extensive use of the Doiran and Vardar railway communications, led to the retention of these two hospitals on the western area. No. 29 General Hospital suffered, however, severely from an air raid at the end of March 1917 and it was then moved to the Kalamaria area.

No. 28 remained on the Monastir site throughout, and was the only hospital there after No. 29 was transferred.

In August 1916 two new general hospitals, Nos. 42 and 43, arrived from the United Kingdom. The latter went to the Kalamaria area. No. 42 was placed in a large and suitable building, the Orphanage, in the new town. It had been selected by the D.M.S. in February 1916 for one of the four general hospitals then under his administration. The accommodation was expanded by huts erected in the grounds of the

Sisters' wards, No. 43 General Hospital, Kalamaria.

institution. In October 1917 the building was required by G.H.Q., and No. 42 General Hospital was then transferred to the Kalamaria area.

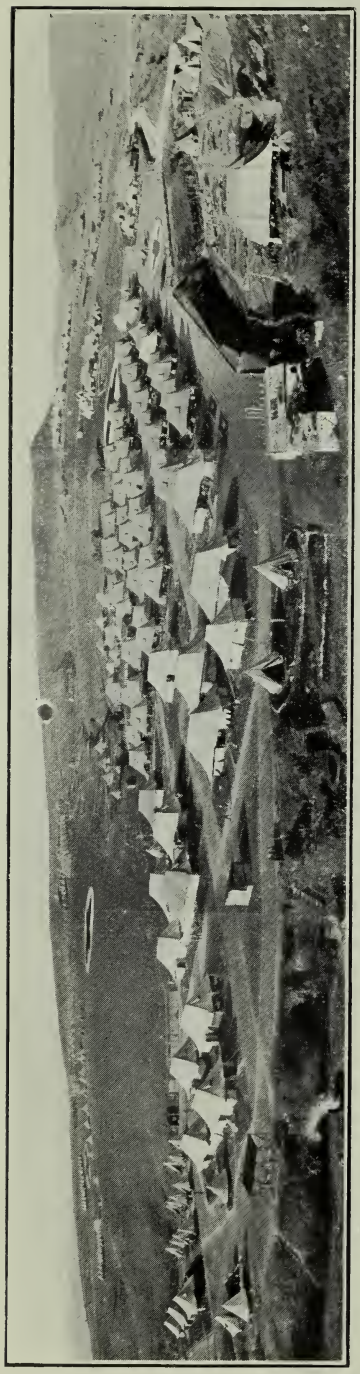
When a great increase in hospital accommodation became necessary, in consequence of the high incidence of sickness from malaria in 1916, and the enemy submarine interference with evacuation by sea in the summer of 1917, eight general hospitals were sent to Salonika from England. Nos. 48 and 49 arrived in May 1917, Nos. 52 and 60 in the following month, Nos. 66 and 68 in July, and No. 67 in August. Five more were transferred from Malta, Nos. 61, 62, 63, 64 and 65. They

arrived in Salonika at the end of July and beginning of August 1917. But Nos. 4 and 5 Canadian General Hospitals were transferred at the same time to England. There were thus seventeen general hospitals with the British Salonika Army during the latter part of 1917, although the force consisted only of four divisions and an independent brigade. The 10th and 60th Divisions and the 7th and 8th Mounted Brigades had been transferred to Egypt at the end of June of that year.

Sisters' wards, No. 43 General Hospital, Kalamaria.

They were distributed as follows :—

Kalamaria	No. 52	in place of No. 4 Canadian
	No. 50	,, ,, ,, No. 5 ,,
	No. 29	
	No. 43	
	No. 42	from the Orphanage, in September
Monastir Road	No. 28	
Hortajkoi Plateau ..	No. 60	
	No. 65	
	No. 66	
Lembet	No. 68	
Uchantar	No. 61	This site was close to the Doiran railway, about 2 miles north-west of No. 28 General Hospital
	No. 62	
	No. 67	
Akbunar	No. 64	
Seres Road (Derbend Pass)	No. 63	
Eurendjik	No. 48	on the Salonika-Kirechkoi road
Anakli	No. 49	between Kirechkoi and Hortajkoi

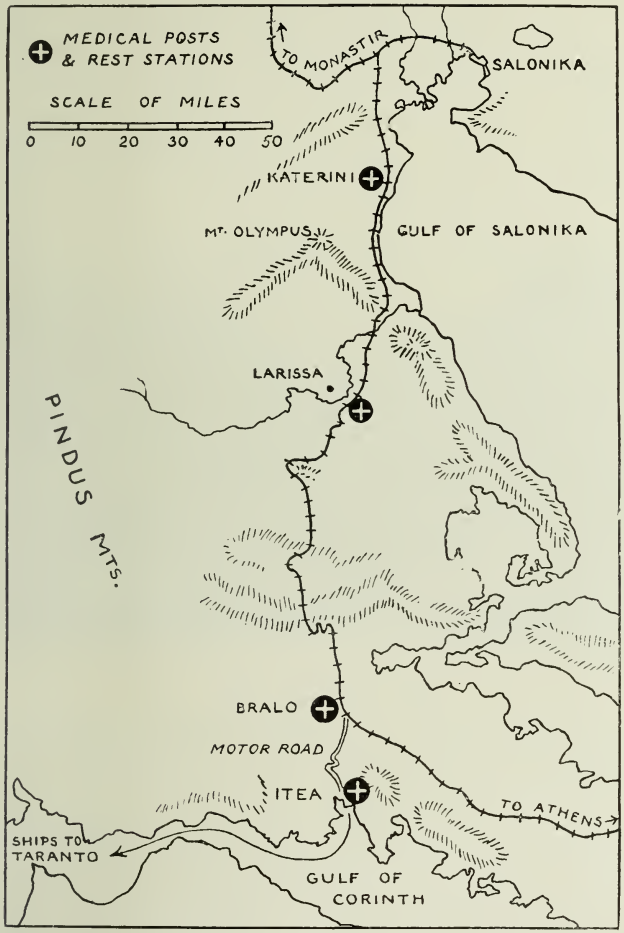


No. 21 Stationary Hospital and hospital sites at Karaissi, Salonika.

Towards the end of 1917 Nos. 62 and 66 General Hospitals were transferred to Italy, and No. 65 to Mesopotamia. They were replaced before the summer of 1918 by Nos. 80 and 82 from England, the former in March and the latter in June. No. 80 took the place of No. 66 on the Hortajkoi plateau. No. 61 from Uchantar replaced No. 65, also on the plateau. A new site was selected for No. 82 on the Great Karaburun promontory at the eastern entrance to the harbour of Salonika. No. 67 from Uchantar was also placed there. An Indian general hospital, No. 48, arrived from Salonika at the time of the Armistice, and opened on the Uchantar site.

Two stationary hospitals, Nos. 20 and 21, arrived from the United Kingdom in December 1915, and were placed on sites near Karaissi, along the Kirechkoi road, south of the site at Lembet where No. 1 New Zealand Stationary Hospital had been opened. The New Zealand hospital was transferred to France at the end of March 1916, and was replaced by No. 1 Canadian Stationary Hospital, which also went to France but not until August 1917. Two new British stationary hospitals, Nos. 29 and 30, arrived in June 1916 and were placed on the Karaissi site near No. 21 Stationary Hospital.

In January 1917 No. 18 Stationary Hospital arrived from Egypt and went to a site near Lembet. The only other stationary hospital was No. 49, originally No. 68 General Hospital, which took over from No. 1 Canadian Stationary Hospital in the latter part of 1917.



SKETCH MAP OF THE BRALO-ITEA LINE OF EVACUATION TO ITALY

Two stationary hospitals were placed nearer the front area in 1917, No. 21 at Sarigol, on the Doiran road behind the British left to replace No. 35 C.C.S. and No. 18 at Lahana, on the Seres road. Nos. 29 and 30 were transferred to Italy at the end of 1917. No. 49 provided detachments for duty at Katerini

and Bralo on the Thessaly railway as posts along the line of evacuation from Salonika to Itea, on the Gulf of Corinth, when this became the route of evacuation to Taranto and the Mediterranean L. of C. through Italy. The whole unit was transferred to Bralo in July 1918. Bralo was the detraining point on the railway line, whence the passengers went by road to Itea. The Thessaly railway had been extended to Salonika, and when this was opened as a line of communication from the Salonika force to Itea a large rest camp was formed at Bralo and another at Itea. From Bralo passengers were taken by cars and lorries across the mountainous country, a distance of about thirty miles by road, to the Gulf of Corinth. On the

Rest camp at Bralo.

railway line they went in passenger coaches, but those who were invalided by this route were made comfortable and did no fatigue duties on the journey. Only invalids who were fit to travel by troop train or ordinary transport across the continent were dispatched by this route, others went by hospital ship. There was a nursing sisters' rest camp with accommodation for eighty at Bralo, and a rest house for them at Itea.

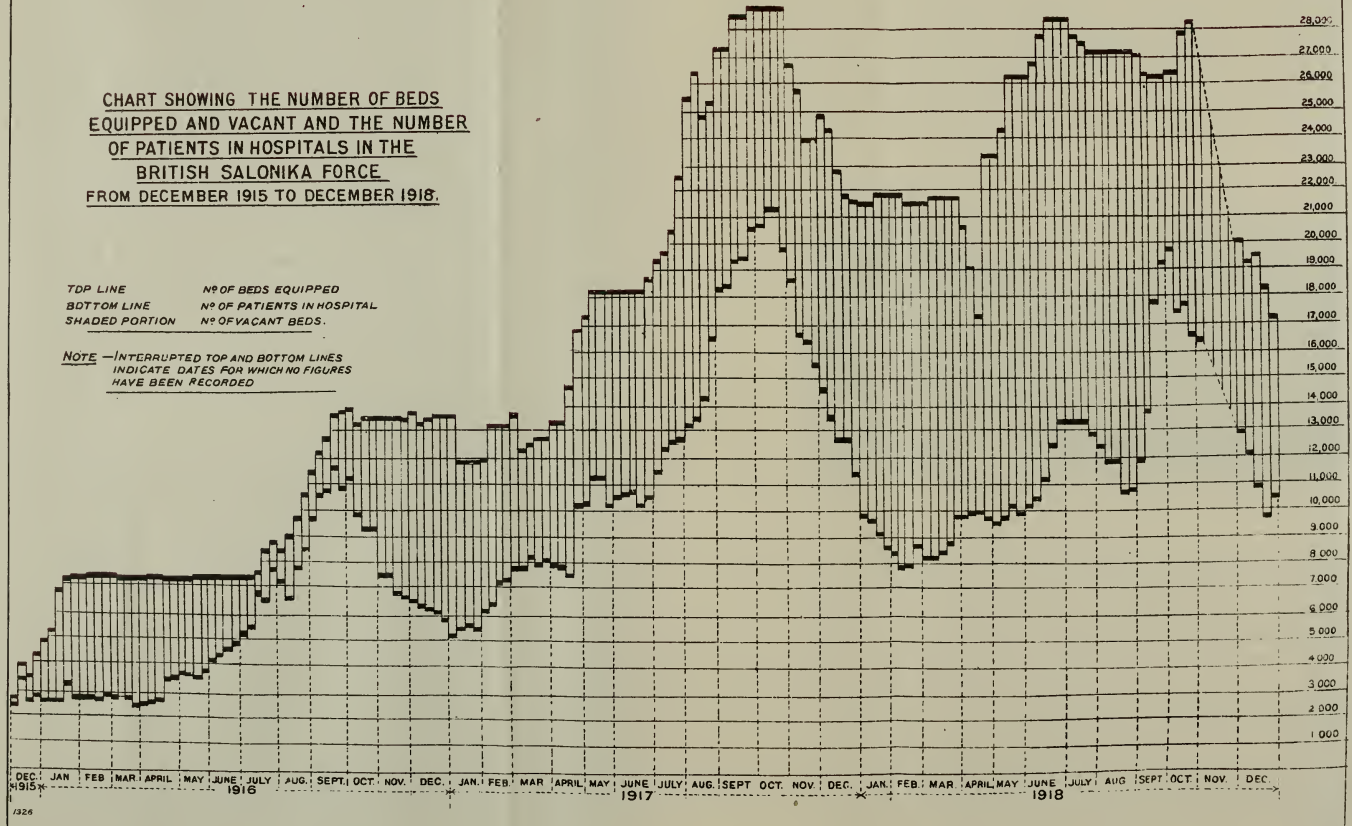
An alternative route had been previously reconnoitred from Salonika to Benitsa, Florina and across the Albanian mountains to Santi Quaranta, and thence by sea to Corfu. There were Italian troops along this line.

The accommodation in the general and stationary hospitals and casualty clearing stations,* which were practically used as

* The five casualty clearing stations after No. 35 C.C.S. left provided between 2,000 and 2,500 of the beds.

To face page 85.

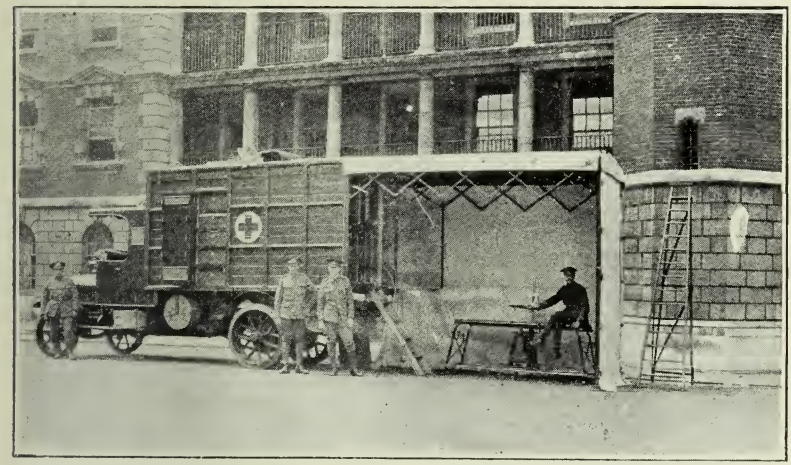
CHART SHOWING THE NUMBER OF BEDS EQUIPPED AND VACANT AND THE NUMBER OF PATIENTS IN HOSPITALS IN THE BRITISH SALONIKA FORCE FROM DECEMBER 1915 TO DECEMBER 1918.



1326

Malby & Sons Lith.

hospitals, amounted to 3,000 beds at the end of 1915, and gradually rose to a maximum of 29,000 during the summer of 1917. During the winter much of the accommodation was closed down, especially in the case of the hospitals on the Hortajkoi plateau, where the cold was intense. The chart shows this fluctuation in hospital accommodation, as affected by season, malarial incidence, and interference with sea evacuation. It will be seen that there was only a very small margin of vacant beds when malaria became intensive in the summer and autumn of 1916, but that subsequently a good margin of 7,000 to 10,000 vacant beds was maintained for battle casualties or for increase in the admissions for disease.



Mobile X-ray lorry in Salonika.

Surgical groups were organized out of the personnel of the base hospitals for duty in casualty clearing stations during battle periods, following the methods adopted in France. Four groups were originally organized, but a fifth group of surgical teams was prepared in August 1918 for the final operations.

The development of convalescent depôts was a feature in the relief afforded to the hospitals, especially after evacuation by sea became restricted. For several months there was only one convalescent depôt. It was opened early in 1916 on slopes just above No. 21 Stationary Hospital in the Karaissi area. A second depôt was opened near it in September 1916. During the summer and autumn of 1917 five additional depôts were

established at various places along the Kirechkoi road, Hortajkoi plateau, the new Hortajkoi-Kapudzilar road, and on the Great Karaburun promontory. Convalescent camps were also formed in corps areas, and at Stavros.

In June 1917 the War Office decided to establish a convalescent camp in Corfu for 2,000 men, organized as two self-supporting units. An officer of the R.A.M.C., Lieut.-Colonel J. D. Ferguson, was appointed to the medical charge of the camp and as senior British medical officer on the island. A detention hospital was opened in the Citadel (Fortezzia Vecchia) in Corfu until August 1st 1918, when it was handed over to a detachment of the Royal Marine Light Infantry. The R.A.M.C. personnel was then transferred to Salonika.

The accommodation in the convalescent depôts varied from time to time. It attained its maximum in the summer of 1918, when accommodation for 19,150 was provided. The chart shows the variation in the extent of this accommodation, and of the number of convalescents in the depôts and camps from week to week.

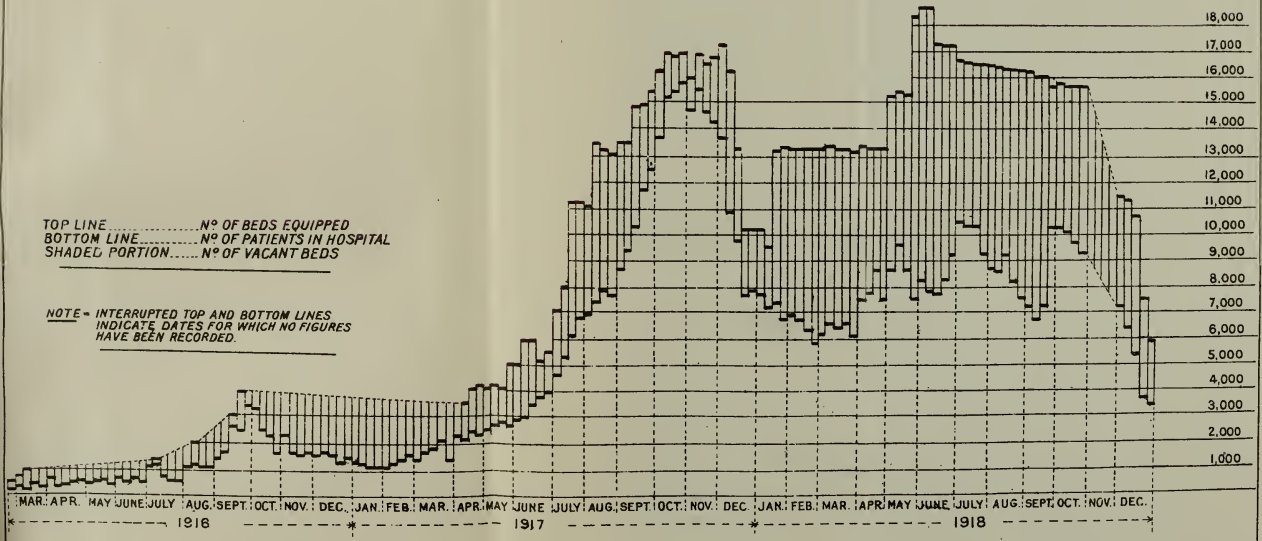
Convalescent homes were also established for officers. One for the personnel of general hospitals was in a house and grounds at Naoussa, presented by the owner, Mr. T. H. Canelly.

Altogether the provision for hospital and convalescent patients of the British Salonika Force amounted approximately to 50,000 beds at one time, equivalent to more than one third of the total strength of the force. This high proportion of beds was the result of restricted evacuation and malaria. It had no parallel in other theatres of war. The accompanying charts exemplify well the effect of restricted evacuation on hospital accommodation.

Hospital and convalescent beds were allotted for special diseases, for Indians and labour corps personnel, and for prisoners of war. The convalescent depôt opened on the Kapudzilar-Hortajkoi road was reserved for convalescents from the enteric group of fevers, and a section of convalescent depôts at Karaissi and Hortajkoi plateau for dysentery convalescents. Wards in No. 42 General Hospital were kept for dysentery patients only, and in No. 49 for enteric cases. Wards were also set apart in each hospital for the treatment and diagnosis of diarrhœa cases. No. 20 Stationary Hospital was a venereal disease hospital. Beds were reserved in various hospitals for neurosis, tuberculosis, and mental and cardiac diseases.

To face page 96.

CHART SHOWING THE NUMBER OF BEDS EQUIPPED AND VACANT, AND THE NUMBER OF PATIENTS IN CONVALESCENT DEPOTS, IN THE BRITISH SALONIKA FORCE, FROM FEBRUARY 1916 TO DECEMBER 1918.



1326

Malby & Sons, Lith.

Dental centres were opened at eight of the hospitals, and ophthalmic centres at two, in addition to centres in the corps areas.

When the scheme, known as the " Y " scheme,* was introduced for sending malarial convalescents to England by the Thessaly railway line for embarkation at Itea, on the Gulf of Corinth, and thence by ship to the Italian base of the Mediterranean L. of C., No. 4 Convalescent Depôt at Karaissi was used as a concentration camp for the men before their despatch to Bralo and Itea. Invalids were, however, also despatched direct from various other hospitals and camps.

For sick amongst the nursing staff, 100 beds were maintained at No. 43 General Hospital.

Until after the Armistice, the Indian troops with the Salonika Force consisted of transport drivers and men of the Indian Mountain Batteries. Their numbers in 1916 were under 1,000. " B " Section of No. 137 Indian Field Ambulance came with them from Mudros in January of that year, and opened in the Monastir road area, near No. 31 C.C.S. It arrived, however, very incomplete, without transport and with practically no tentage. It was also short of personnel. No. 110 Indian Field Ambulance joined it from Mudros in February 1916. These field ambulances remained as distinct units until May 1918, when it was found that No. 110 Indian Field Ambulance had developed into an ambulance of seven sections, partly in Egypt and partly in Salonika, instead of the four sections which formed a field ambulance according to the Indian organization. Consequently the sections in Egypt were formed into a new field ambulance, No. 157, and " B " Section of No. 137 was absorbed into No. 110 in Salonika.

There was no stationary or general hospital for Indians until after the Armistice, when No. 48 Indian General Hospital arrived and opened on the Uchantar site.† Until then the Indian field ambulances, which remained stationary at the base, acted as hospitals for the Indians. But occasionally Indians had to be received into field ambulances and casualty clearing stations in corps areas. Some of the Indian personnel from the Indian field ambulances were then detailed for duty in the British units in these areas, in order to assist in the care of the Indians.

---

* There were several other lettered schemes for disposal of different classes of invalids, such as cardiac cases, mental cases and cases of general physical unfitness.

† The D.M.S. in January 1916 had asked for a fifty-bed section of a stationary hospital, but it was not sent.

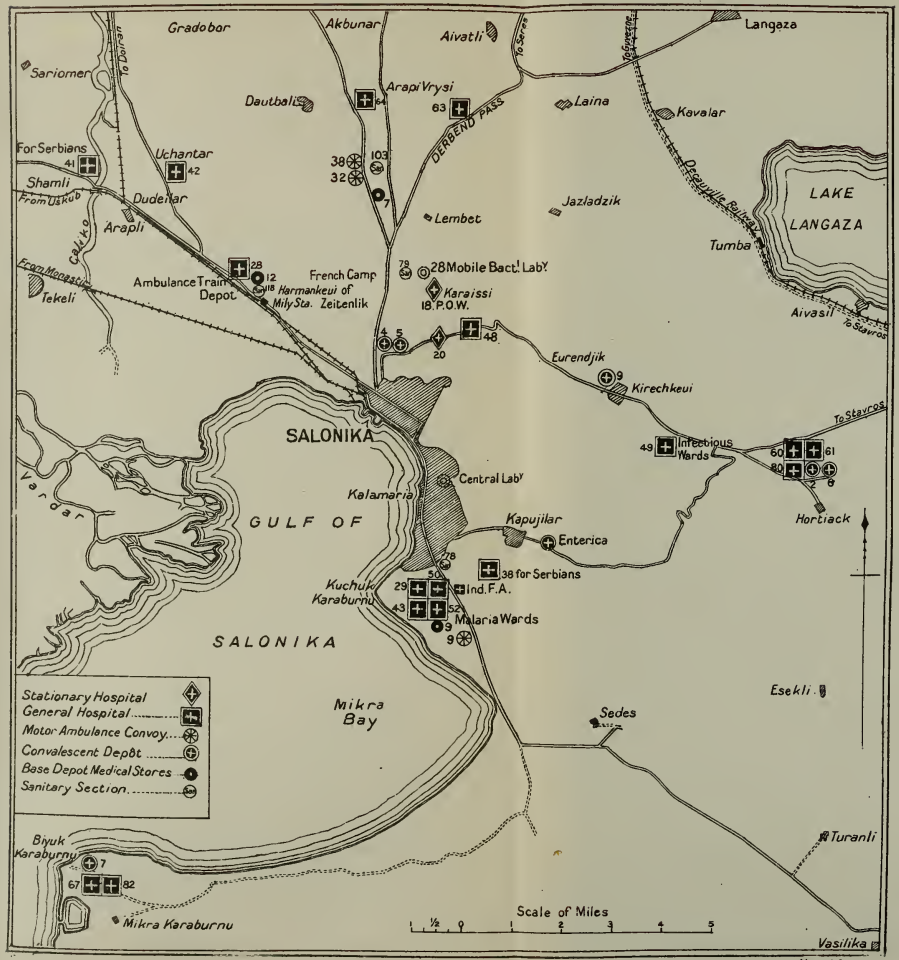
The Labour Corps consisted of Macedonian, Cypriot and Egyptian muleteers, and Egyptian, Greek, Serbian and Maltese labourers. They were placed on a military basis and given uniforms towards the end of 1917. The numbers employed amounted to some 20,000. They were distributed for work in corps areas and at the base. The medical arrangements proposed for them by the D.M.S. were to detail a medical officer for every 1,000 men in order to exercise sanitary control and treat men not sufficiently ill to require admission to hospital. In field ambulances and casualty clearing stations the sick were treated temporarily in separate tents. At the base 300 beds were maintained in No. 20 Stationary Hospital for enlisted Macedonian and Cypriot muleteers in September 1916. In March 1917 about 19,000 Greek labourers were being employed by the British. The Greek medical authorities were responsible for their sick, but serious cases were treated in British hospitals. In 1918, 700 beds for Macedonian labour corps were allotted in No. 20 Stationary Hospital. For a Maltese labour battalion 100 beds were allotted in No. 21 Stationary Hospital.

Prisoners of war, requiring admission to hospital, were received into No. 29 Stationary Hospital in 1916. All prisoners of war, on admission to an internment camp, were medically examined, bathed, disinfected, inoculated against cholera, and segregated for seven days under daily medical supervision by the personnel of this hospital, until it went to Italy at the end of 1917. A hospital, however, was organized on the same site at Karaissi and designated the Lembet Prisoners of War Hospital. No. 18 Stationary Hospital was moved to the site in July 1918 and took over the duties previously carried out by No. 29 Stationary Hospital in connection with prisoners of war. The Lembet Prisoners of War Hospital as such was then demobilized.

Two field ambulances, the 2/1st and 2/3rd Northumbrian, were sent to Salonika in September 1916 as army troop field ambulances. They were organized as non-mobile units without the transport of a mobile field ambulance. Consequently they were employed as stationary hospitals or casualty clearing stations. Thus a stationary hospital was formed at Stavros by the 2/1st Northumbrian Field Ambulance from September 1917 to the time of the Armistice and afterwards. The 2/3rd Northumbrian Field Ambulance acted as a casualty clearing station at various places along the Seres road from Orliak to Guvesne during the latter half of 1916, and in 1917 and 1918.

To face page 98.

GENERAL MAP OF SALONIKA BASE SHOWING POSITION OF MEDICAL UNITS, 1918.



Malby & C.

The Salonika force had to provide a R.A.M.C. establishment in the islands of the Aegean Sea, such as Mudros, where there were Royal Air Force posts. Small hospitals were maintained there, and a R.A.M.C. establishment of five officers and sixty-four other ranks were employed in Lemnos, Thasos and Lesbos. Major Blackwell acted as Senior Medical Officer for this detachment with his headquarters at Mudros.

Medical Personnel.

As in other theatres of war, the maintenance of sufficient reinforcements of personnel for the medical units was always difficult, but in Macedonia it was intensified by the fact that the medical personnel was attacked by malaria as severely as others. In March 1916, before malaria was prevalent, there were 541 medical officers and 4,870 other ranks of the R.A.M.C. with the British Salonika Force. The medical officers did not all belong to the R.A.M.C., for 77 were Canadian, 10 New Zealand and 3 Indian Medical Service officers. The deficiencies in personnel gradually increased and in August 1917 amounted to 347 officers and 826 other ranks. The deficiency was made good, however, during the following month. Another difficulty was the maintenance of a sufficient number of transport personnel with the field medical units. In January 1917 this deficiency amounted to 749, or nearly 50 per cent. of the establishment.

In June 1918 a few General Service members of Voluntary Aid Detachments were sent out to Salonika to replace R.A.M.C. personnel in one of the general hospitals. It was estimated in August 1918 that 255 would be required to set free 159 male personnel, but No. 43 General Hospital was the only hospital actually provided with a V.A.D. general service establishment.

An enquiry was held by Lieut.-General Sir H. M. Lawson from the War Office in 1918 into the question of personnel, and the D.M.S., on the 10th July of that year, submitted a statement to the effect that the minimum establishment of medical officers, on the basis of which medical units could be worked, was 30 for a general hospital of 1,540 beds, 10 for a stationary hospital, 8 for a field ambulance, 6 for a casualty clearing station in a corps area, and 4 for one in a base area, 2 for a motor ambulance convoy, and 2 for an ambulance train.

For maintaining reinforcements of bearers two reserve bearer companies of 114 N.C.Os. and men, reduced to one company in November 1917, were formed of men unfit for duty

in the front line, in imitation of the reserve bearer companies formed in Boulogne for work on the Western front. They were distributed to casualty clearing stations and ambulance trains.

At first no nursing sisters came with the hospital units to Salonika. The transport on which the New Zealand Stationary Hospital was being carried from Egypt was torpedoed in the Aegean and, unfortunately, many of the nursing sisters were drowned. Afterwards nursing sisters were only sent to Salonika when the D.M.S. notified that suitable accommodation was available for them. Casualty clearing stations were not given nursing sisters until May 1916, when seven were sent to No. 28 and No. 40 C.C.S. During the period of maximum hospital accommodation, the nursing staff numbered 1,574. A large number, 302, were Australian nursing sisters,* and 366 were members of Voluntary Aid Detachments; 311 belonged to the Territorial Force Nursing Service, and the remaining 595 to the Q.A.I.M.N.S. and its reserve.

Medical and Surgical Stores.

When the British force was sent to Salonika, one base and one advanced depôt of medical stores were sent with it. The base depôt, No. 7, had been placed in a very unsatisfactory and inadequate building on the west of the town, and on the arrival of a second base depôt, No. 9, in January 1916, the D.M.S. obtained the use of a large weaving factory on the sea front for these depôts, No. 9 being kept there in reserve. A third base depôt, No. 12, arrived in February 1917. It was placed in another building in the west of the town. During the great fire at Salonika in August 1917 the building in which No. 7 Base Depôt was housed was destroyed. About one-sixth of the stores, including 2,800 lb. of quinine, and all the ether and chloroform were salved. No. 12 Base Depôt was not affected.

The advanced depôt, No. 9, on its arrival was placed in December 1915 at Lembet, but went forward to Janes in August 1916 with the XIIth Corps. A second advanced depôt, No. 22, arrived in September 1916, and was placed at Lahana on the Seres road with the XVIth Corps.

British Medical Services with Allied Forces.

The British medical services were called upon to provide hospitals and medical and surgical material for the Serbian and Hellenic forces as well as to some extent for other allies.

* Three nursing units left Australia for Salonika in June 1917 and arrived during July and August.

When the Royal Serbian Army was reconstituted and landed at Mikra Bay in May 1916, the British Government agreed to provide hospitals for it. Previous to this, the French medical authorities in Salonika had undertaken all the arrangements for Serbians who had found their way in 1915 into Salonika during the retreat. A Scottish Women's Hospital, under Mrs. Harley,* a sister of Field-Marshal the Earl of Ypres, who had been working with the French Army in France, had accompanied the French divisions to Salonika, and went forward into the Vardar Valley. After the withdrawal from Serbia, it was established near the beach in the Kalamaria district of Salonika, and, under the French authorities, became the hospital for Serbian sick and wounded during the winter of 1915–16. On the 14th May 1916, the Serbian Director of Medical Services asked the D.M.S. of the British Force whether 7,000 hospital beds could be given to him. Consequent upon this demand, three British general hospitals, Nos. 36, 37 and 38, were sent from England to Salonika to be attached to the Serbian Army. The first of these arrived on the 25th June 1916. A fourth general hospital, No. 41, came later in August 1916, and a stationary hospital, No. 33, in October 1916. Previous to that time there was a British Mission with the Serbian Army, together with British mechanical transport units of some 1,000 to 1,500 mechanical transport drivers. A section of No. 143 Field Ambulance was attached to the British Mission for the sick amongst them. This unit arrived at Durazzo in January 1916, but two of its sections, "A" and "C" returned to England. "B" Section was sent to Corfu, whence it was transferred to Salonika. The British Mission left on the 18th July 1916, but as the mechanical transport units remained with the Serbians, No. 143 Field Ambulance section was retained, and accompanied the Serbian Army when it moved from Mikra Bay to Banitsa towards the end of the year. It remained at Banitsa as a small detention hospital for the British units until March 1917, when it was withdrawn to the British base in Salonika and there re-constituted as a complete field ambulance for the independent brigade, the 228th Infantry Brigade, which had been formed of garrison battalions.

As the responsibility for the Serbian Army medical arrangements was undertaken by the French, it was decided that the interior administration of the British general hospitals only should be carried out by the British medical authorities under

* To everyone's regret Mrs. Harley was killed by shrapnel shell in Monastir in March 1917, when her unit had gone up there with the Franco-Serbian force.

the D.D.M.S., L. of C., and that all transport of sick and wounded to and from them would be undertaken by the French, who would also, in conjunction with the Serbian D.M.S., determine their positions. Consequently, a liaison officer was appointed to the French Army Headquarters to be in touch with the French liaison officer who had charge of the general arrangements for the reception and evacuation of Serbian sick and wounded. Major F. A. Stephens, R.A.M.C., took over these duties in August 1916, but shortly afterwards Lieut.-Colonel J. C. B. Statham was appointed. His place was taken in November 1916 by Captain W. L. Murphy. Médecin-Major Julia of the French Army Medical Service supervised on behalf of the French General Headquarters the arrangements for the reception and evacuation of Serbian casualties. The Director of Medical Services of the Royal Serbian Army, Colonel Sondermeyer, was also closely associated with both the British and French liaison medical officers, and with the Directors of the Medical Services of the French and British Forces. One of the British hospital ships was lent to the French authorities for the evacuation of Serbian patients to Bizerta in Tunisia, but the general scheme of evacuating Serbians overseas was afterwards abandoned at the request of the Serbian General Staff. In September 1917 medical officers of the Serbian Army made a tour of the British corps and base areas for instruction in methods of field sanitation and in the measures taken for the prevention of malaria, and in the following year steps were taken to replace R.A.M.C. orderlies in the British general hospitals with the Serbians by Serbian orderlies on a basis of three Serbians to replace two British, but it was not till September 1918 that effect was given to this, when 113 Serbian orderlies relieved R.A.M.C. personnel. Steps were also taken in 1918 to teach disabled Serbian soldiers trades in the British Army workshops.

No. 36 British General Hospital with the Royal Serbian Army was established at Vertekop from 10th July 1916 onwards. The accommodation, originally for 1,040 beds, was increased to 1,540 at the beginning of August. During the whole period of its work with the Serbians, this hospital had many difficulties to contend with as regards rations, sanitation, transport, and evacuation of casualties. It was constantly subject to bombing by enemy aircraft, and appears to have been used for the reception not only of Serbian sick and wounded, but also for prisoners of war and Italian and Russian sick from troops passing through Vertekop.

No. 37 British General Hospital was also opened at Vertekop. It suffered in the same way as No. 36. In one of the air raids, on 12th March 1917, two of the staff nurses of the Q.A.I.M.N.S. (R.) on duty in the hospital were killed, and much damage was done to the hospital tentage and equipment. In the final operations many French wounded were admitted into this hospital, as also a very large number of cases of influenza and broncho-pneumonia.

No. 38 British General Hospital went on arrival to a site selected by the French medical authorities at Sedes, but shortly afterwards was moved to a site near Kapudzilar Village. It received sick from the Serbian depôts at Mikra Bay. Nothing of special note occurred in connection with its work.

No. 41 General Hospital was established at Shamli on the right bank of the Galiko river on the Monastir road near the railway and road bridges. Nothing of importance is noted in connection with its work.

No. 33 Stationary Hospital went to Sorovitch near the south-west end of Lake Ostrovo, on the Monastir railway line, where it opened in November 1916. Its accommodation was expanded to 600 beds. Its personnel carried out much work in bathing and disinfecting the Serbian divisions concentrated about Sorovitch in 1916 and 1917.

The Hellenic Divisions and Hellenic Army Corps had two hospitals in Salonika, and had a field medical organization similar to that of the French army ; but their sick and wounded were evacuated to the hospitals in Salonika by the motor and horse ambulance transport and ambulance trains of the British Medical Service. Previous to the final operations, three general and three stationary hospitals were also provided by the British for the use of the Greek sick and wounded, and these and five other Greek hospitals were supplied with medical and surgical stores from the British depôts. Greek casualties, however, were admitted into the British hospitals indiscriminately. On the Greek front west of the Vardar a hospital was established at Tossilovo, with the assistance of an officer and eighteen other ranks of the R.A.M.C. from No. 18 Stationary Hospital, who were placed temporarily at the disposal of the G.O.C. of the Greek Army Corps in July 1918. When the Greeks took over the Struma front the motor ambulance and lorry transport and casualty clearing stations along the Salonika-Seres road, and the ambulance transport arrangements on the Decauville railway in the Struma Valley and at Stavros were placed at their disposal for evacuation to Salonika. The hospital at

Stavros formed by the 2/1st Northumbrian Field Ambulance was prepared to supply the equipment for a Greek hospital there, if necessary.

In the Greek refugee camps British nursing sisters and members of V.A.Ds. were on duty in 1917 until relieved on the 17th September of that year by the ladies of the Greek Red Cross Society.

Other Allies—French, Italian and Russian—were helped by British Medical Services in Salonika in various ways, more especially by provision of medical and surgical stores and in evacuation of sick and wounded down British lines of evacuation.

The Problems of Disease Prevention.

The great dominating factor throughout the occupation of Macedonia by the British Salonika Army was malaria. The possibility of malaria becoming a serious cause of inefficiency was recognised by the D.M.S. of the Force, Surg.-General W. G. Macpherson, immediately on his arrival in Salonika towards the end of November 1915. Lieut.-Colonel Sir Ronald Ross, who was acting as a consulting physician to the Mediterranean Expeditionary Force, had previously visited Salonika with Surg.-General Babtie, the P.D.M.S., and Lieut.-Colonel Stammers, the A.D.M.S. for Sanitation. Sir Ronald Ross visited the Monastir road area and proposed a scheme for drainage of the marshes south of the road. He also reported that malaria was likely to become prevalent in the following June and July and still more so in 1917. A plan for an anti-malarial campaign was consequently drawn up by the D.M.S. in January 1916. The lines on which it was to be conducted were as follows :—

1. Detailed surveys of localities occupied by troops.
2. Collection of information regarding the prevalence of malaria amongst the local inhabitants.
3. Appointment of malarial officers to divisions and formation of mosquito brigades in all divisions.
4. Drainage of swamps and canalization and clearing of streams.
5. Elimination of local sources of infection by administration of quinine to the civil population in areas occupied by the troops.
6. Rendering huts and dugouts mosquito proof.
7. Provision of large supplies of mosquito netting.

8. Provision of mosquito repellant substances for application to exposed parts of the body.
9. Administration of prophylactic doses of quinine to the troops. This was recommended by Sir Ronald Ross to be commenced in June.

On 21st December 1915 the D.M.S., with the sanction of the G.O.C. British Forces, and General Sarrail, the Commander-in-Chief of the French Forces, initiated the formation of an International Hygiene Committee, which met under Surg.-General W. G. Macpherson's chairmanship for the first time on

Sunshade with mosquito curtain attached to stretcher on wheeled stretcher carrier, Macedonia.

27th of the month in the French Hygiene Laboratory. The Director of Medical Services of the French Army, Médecin-Principal Ruotte, Médecin-Principal Niclot, Chief of the French Hospital Centre in Salonika, Médecin-Major Armand Delille, the officer in charge of the French Laboratory, the British A.D.M.S. for Sanitation, and Médecin-Major Armand Delille's laboratory officers, Médecin-Adjoints Paisseau and Lemaire, formed the original committee, together with Dr. Copinaris, the Greek Medical Officer of Health for Macedonia. Dr. Copinaris gave valuable information regarding the villages where malaria was most prevalent, as well as information regarding epidemic diseases, such as cholera, typhus and plague. The Committee

subsequently included the Senior Medical Officer of the French Navy, Médecin-Principal Labedens, who had charge of the sanitary arrangements for the reception and disinfection of the Serbian Army after its retreat through Albania, and the Serbian, Greek and Italian Principal Medical Officers. In January and February 1916 malarial surveys were carried out within the perimeter of the entrenched camp by medical officers of divisions in conjunction with staff officers. In consequence of these surveys troops were moved, whenever military considerations permitted, from the most malarious localities, notably from the

Quinine parade, Macedonia.

regions bordering on the Langhaza and Beshik Lakes. Draining of 1,500 acres of swamps south of the Monastir road was commenced in February and completed in May 1916. Similar drainage operations were carried out in marshy areas along the Galiko river and in the vicinity of Lembet village, on the Hortajkoi plateau, and elsewhere in the area of the entrenched camp. When the troops moved forward, constant work was carried out for canalizing streams in the areas occupied by the divisions, and for oiling collections of water.

In conjunction with the French, efforts were made, from February 1916 onwards, to eliminate foci of infection amongst

Greek refugees, who were housed in a refugee settlement on the Salonika-Lembet road near the Allied camps, under the supervision of French and British medical officers. These refugees were carriers of a virulent form of malaria, many deaths were occurring amongst them, and in January 1916 the Greek Director of Public Health appealed to the French and British authorities to provide quinine for their treatment, as the supply in Greece was limited. It was some time, however, before the D.M.S. of the British Force was able to obtain a sufficient quantity of quinine, notwithstanding repeated telegrams to the

Quinine parade for native labourers, Salonika.

P.D.M.S., M.E.F. urging an immediate provision. It was only after the whole correspondence had been sent by the D.M.S. to the D.G.A.M.S. at the War Office, that steps were taken to forward an adequate supply to Salonika.

The occupation of areas in advance of the entrenched camp and the Struma Valley in the summer of 1916 at short notice prevented measures being taken in these intensely malarial areas in time to avoid malaria. A severe and widespread outbreak consequently occurred in July. The only rapid means of prevention was the provision of mosquito nets for use in bivouacs and dugouts. Bell-shaped nets were tried but had only a limited usefulness, and were not obtainable in sufficiently large numbers for immediate distribution. The same delay in

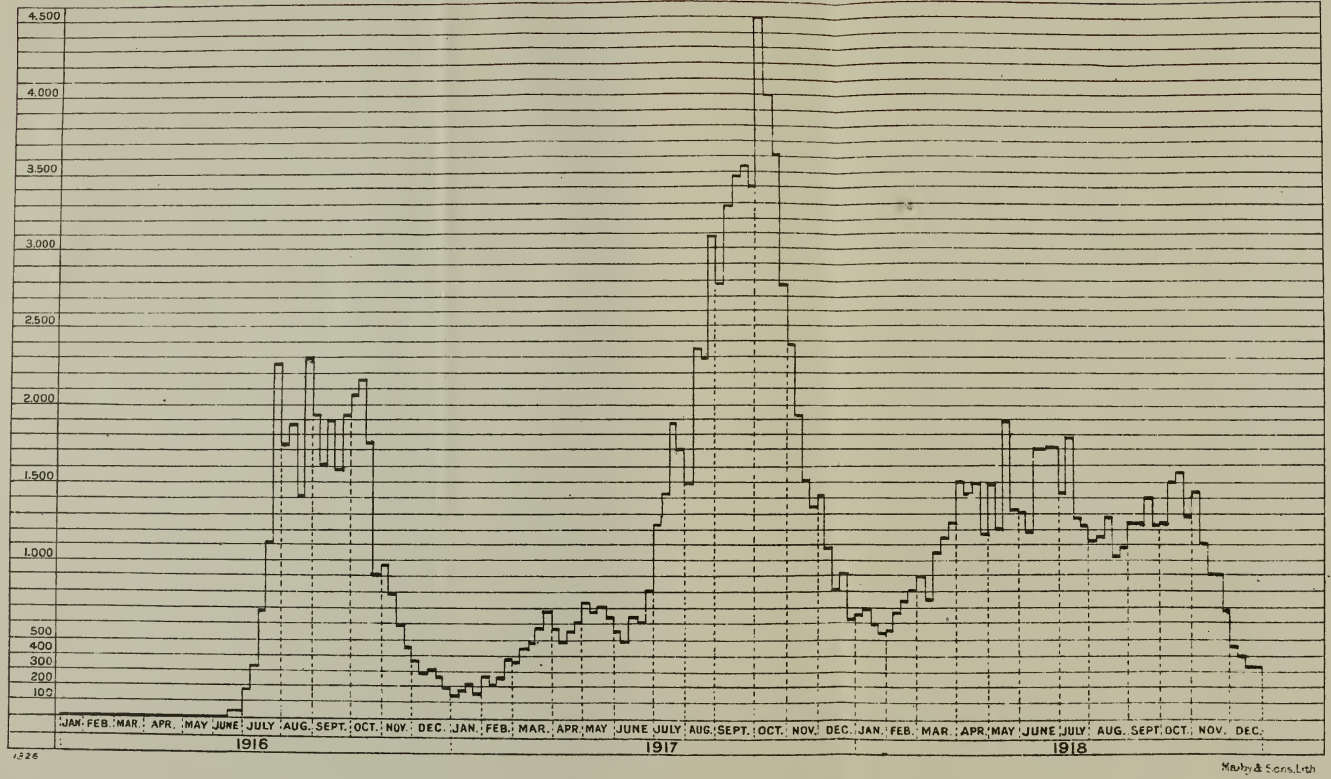
obtaining netting from Egypt, as in the case of quinine, was experienced. Smaller pattern nets were tried and an issue of netting 6 ft. by 4½ ft. was made to each individual, but they failed, partly on account of the small size of the net and the difficulty of obtaining poles to support it, and partly through lack of intelligent use of the net on the part of the men. This was always a cause of trouble, even when suitable nets in sufficient numbers were supplied. Eventually two patterns were employed, a bivouac net which could be used without supports, designed by Major Galwey, D.A.D.M.S. at Army Headquarters, and a net for use by troops in tents, designed by Lieut.-Colonel Aldridge, the A.D.M.S. for Sanitation. Mosquito netting for the protection of the head and neck, gloves for the hands and shorts with turndown flaps were issued during the summer of 1917 and subsequently. All kinds of mosquito repellants were tested and issued to the troops, but none proved altogether satisfactory. Quinine prophylaxis, as recommended by Sir Ronald Ross and the Medical Advisory Committee, was not favourably reported on by medical officers, but it was decided to continue it during the summer of 1916, as there was some evidence to show that it mitigated the severity of the attacks. Orders were issued for daily doses of five or six grains to be given to troops in malarial areas from the 1st June 1916, but as the summer went on all troops, whether in a malarial area or not were given quinine. The evidence, however, of the value of quinine prophylaxis during this very extensive application of its use in 1916 was negative, so far as prevention of attacks of malaria was concerned. The most useful and successful work carried out were the malarial surveys and subsequent drainage and mosquito destruction operations, which were continued over wide areas in the following years.

The number of admissions for malaria amongst the British troops during 1916, 1917 and 1918, month by month, was as follows :—

Month.	Admissions.	Deaths.
January 1916	6	—
February ,, ...	3	—
March ,, ...	8	—
April ,, ...	9	—
May ,, ...	22	—
June ,, ...	97	2
July ,, ...	4,580	88
August ,, ...	7,511	26

To face page 109.

CHART SHOWING WEEKLY INCIDENCE OF MALARIA – BRITISH SALONIKA FORCE. JANUARY 1916 TO DECEMBER 1918.



1526

Maybry & Sons, Lith

Month.	Admissions.	Deaths.
September 1916	8,941	112
October ,, ...	6,872	70
November ,, ...	2,788	16
December ,, ...	1,387	12
January 1917	677	3
February ,, ...	1,113	1
March ,, ...	2,553	1
April ,, ...	2,233	2
May ,, ...	2,759	5
June ,, ...	3,139	1
July ,, ...	6,228	27
August ,, ...	9,242	48
September ,, ...	16,488	84
October ,, ...	14,921	41
November ,, ...	7,200	22
December ,, ...	4,859	15
January 1918	2,513	3
February ,, ...	2,787	6
March ,, ...	5,107	3
April ,, ...	5,634	3
May ,, ...	5,921	1
June ,, ...	7,655	8
July ,, ...	5,714	9
August ,, ...	5,675	16
September ,, ...	3,892	20
October ,, ...	5,555	113
November ,, ...	5,670	42
December ,, ...	1,852	21

The chart also shows the weekly admissions for malaria during these years.

The table and chart clearly show the inefficiency caused by moving troops into intensely malarial areas during the summer. The importance attached to prevention of malaria in a force operating in Macedonia was brought to the notice of the military authorities by the D.M.S. during the winter of 1915-16.

With the advent of the cold weather of 1916-17 malaria rapidly abated, but it recrudesced, as was anticipated, in the summers of 1917 and 1918, with greater incidence than ever, notwithstanding the unremitting efforts to prevent it. The increase, however, was mainly due to recrudescence of the disease amongst men infected in 1916.

Further details of the measures adopted for its prevention are fully recorded in the volumes on the Diseases and Hygiene of the War.* It is sufficient here to draw attention to this

* Diseases of the War, Vol. I., Chaps. IX and X. Hygiene of the War, Vol. II., Chap. VIII.

disease as dominating the military and medical situation in Macedonia.

Other diseases which caused anxiety, but which at no time led to a definite outbreak, were cholera, typhus and plague. Cholera was known to be prevalent amongst Turkish and other enemy forces. It was reported to be prevalent amongst the Bulgarian troops in August 1916, and to be epidemic in Asia Minor in October 1917. Prophylactic inoculations had been carried out amongst the British troops during the winter of 1915–16, and resulted in an exceptionally high degree of protection. In the majority of units 90 to 100 per cent. of the officers and men had been inoculated, and although one or two suspicious cases had been reported in June 1916, no definite case of cholera occurred.

Typhus had been the scourge of the Serbian Army in 1915. The story of its suppression by a British Medical Mission to Serbia under Colonel W. Hunter and Lieut.-Colonel Stammers in March and April of that year is told in the first volume of the Diseases of the War,* and elsewhere. The French authorities undertook arrangements for the disinfection and isolation of the Serbian Army after its retreat and on its disembarkation in Mikra Bay after its reconstitution. The measures were so successfully carried out that typhus fever never became prevalent subsequently amongst the Allied Forces in Macedonia, although a few cases occurred amongst the Serbian troops after landing at Mikra Bay, and amongst the civil inhabitants of the neighbouring village of Kapudzilar in May 1917. An outbreak of typhus occurred also in Mitylene on the island of Lesbos in February 1918, and was dealt with by the French medical authorities there. Disinfecting and bathing establishments were actively in use in all divisions. Serbian barrels for disinfection purposes had been distributed in large numbers to the units during the winter of 1915–16, and the D.M.S. initiated the construction of an army disinfecting and bathing establishment at Lembet in December 1915. It was completed in March 1916.

Plague was feared in consequence of the number of Greek refugees arriving in Salonika from ports in Asia Minor, and the constant sea communications between these ports and Greece previous to the entry of Greece into the war on the side of the Allies. Consequently, in January 1916, the International Hygiene Committee organized schemes for the destruction of

* Diseases of the War, Vol I, Chap. V.

rats in Salonika, the pathological examination of rats found dead, and the extermination of rats on board ships in harbour. Plague had been reported to be prevalent during that month in Syra, and application was at once made for a supply of plague vaccine. No cases, however, occurred in Macedonia. A serious epidemic of the disease occurred in Smyrna in June 1917, and precautions in the port of Salonika were again strictly enforced.

Dysentery was never so serious a disease amongst the troops of the Salonika Army as it had been in the Dardanelles. Measures for the immediate incineration of waste products, prevention of fly breeding and protection of food from flies were instituted immediately after the disembarkation of the British Force. There was a considerable amount of the disease, however, in the 10th Division after its arrival from the Dardanelles, and in the 27th Division after it had taken over an insanitary area from Allied forces in August 1918.

Influenza appeared in epidemic form at the beginning of September 1918. It first broke out in the 22nd Division, but spread rapidly to the other divisions. Isolation camps were formed in divisional areas, and field ambulances were allotted for the treatment of the cases. Only those patients who required special nursing were evacuated to the casualty clearing stations and base hospitals. A general hospital was reserved for their reception, and another cleared as a reserve hospital for them in the event of its being required.

Relapsing fever was prevalent in February 1916 amongst men of the Indian Mule Corps.

Sand-fly fever was a common cause of inefficiency. A large number of cases had occurred in July 1916 in troops camped near the Greek artillery barracks at Lembet. Ten thousand bivouac pattern and 10,000 hospital pattern nets of 22 threads to the inch were recommended by the D.M.S. in December 1917 to take the place of a similar number of mosquito nets in the summer of 1918, as a protection against sand flies.

During the blizzard of November 1915, the 10th Division, then in Serbia, suffered severely from frostbite ; 998 cases were evacuated to No. 4 Canadian General Hospital, then open on the Monastir road. Some of the cases were very severe. Special instructions were issued for the prevention of frost bite and trench foot during the subsequent winters.

Trench fever was recognised as a distinct disease during the winter of 1915–16. Although the cases were diagnosed as pyrexia of uncertain origin (P.U.O.), the D.M.S. suggested

that they should be differentiated for the time being as cases of "P.U.O.(*a*)."

Cerebro-spinal fever was not a prevalent disease, but a few cases occurred amongst Greek labourers at the Lembet Camp in February 1916. Instructions were issued during that month for the prevention and treatment of trachoma, which it was feared might be introduced from Egypt or contracted from Macedonian labourers.

Venomous snakes were found in the mountains around Salonika. Consequently, in March 1916, the D.M.S. applied for a supply of anti-venine, and it was decided to issue three Lauder-Brunton outfits to each regimental unit for the treatment of cases of snake poisoning.

With regard to venereal disease, although a considerable number of the troops contracted the disease in Salonika and Macedonia, the majority of the cases, at any rate in the early stages of the British occupation, were contracted in Marseilles before embarkation for Salonika. Thus of 442 venereal patients admitted to the hospital for venereal diseases during January and February 1916, 271 had become infected in Marseilles, 63 in Alexandria, 68 in places outside Salonika, and only 40 in the town of Salonika.

There was a certain amount of heat exhaustion, notably in the 28th Division, during an experimental march in May 1916, but none of the cases were serious. They led, however, to an enquiry into the most suitable form of head dress during the summer. Slouch hats had been provided with puggaries and neck curtains, but no cases of heat stroke were directly attributable to insufficient protection of the head. The slouch hats, however, were replaced by helmets, and orders were issued for them to be worn between 8 a.m. and 5 p.m. Steel helmets were provided with covers and neck curtains.

Medical Units for Prevention of Disease.

Sanitary sections came with the divisions to Macedonia, but several others were sent from the United Kingdom, and two, Nos. 117 and 118, were formed in Salonika at the end of 1917. No. 117 became a sanitary section for the XIIth Corps area. No. 97, from the United Kingdom, was attached to the XVIth Corps from the time of its arrival in July 1916 onwards. Two sections, Nos. 78 and 79, were employed at the base from November 1915, and three others, Nos. 98, 102 and 103, in L. of C. areas. No. 98 arrived in July 1916, and Nos. 102 and 103 in January 1917.

Colonel Hunter's Advisory Committee for the prevention of epidemics visited Macedonia during November 1915 and also in May 1916, and again later in the year.

Several laboratories for bacteriological, protozoological and hygienic investigations, came from the United Kingdom. No. 1 Mobile Hygiene and Nos. 1 and 2 Mobile Bacteriological Laboratories arrived in January 1916, and were renumbered Nos. 25, 26 and 27, respectively, at the end of 1917. A third mobile bacteriological laboratory came out in June 1917, and was designated No. 28. A Central Base Laboratory arrived at the end of January 1916 and opened in the same building as the office of the D.M.S. It sent branches to work in the XIIth and XVIth Corps areas at Sarigol and Lahana in 1918. In October 1917 a laboratory was established under Lieut.-Colonel Wenyon for the study of protozoology and entomology in No. 52 General Hospital. It became specially a malarial enquiry laboratory.

Specialists in various departments of preventive medicine were appointed from time to time. Sir Ronald Ross arrived at the end of December 1917 from the War Office to report on the malarial problem. Lieut.-Colonel L. S. Dudgeon was appointed a consulting bacteriologist in August 1916, and Major E. E. Austen acted as an entomologist for the study of biting flies in the Struma Valley between July and September of that year. Dr. E. H. Leiper, as bacteriologist, and Lieut. J. Waterston as entomologist, were also engaged in special investigations in 1918, the latter in connection with sand-fly fever.

In addition to the International Hygiene Committee, an International Municipal Committee, with the Mayor of Salonika as president, was appointed in March 1917, to deal with problems of sanitation in the town of Salonika and its vicinity. The town was divided into four districts; a British, French, Greek and Italian, in the following June, and each nationality was made responsible for the sanitary condition of its district.

It may be said generally that this mutual co-operation amongst the medical authorities of all the Allies in Macedonia, as initiated in December 1915 by the Director of Medical Services of the British Force, proved of inestimable value in controlling disease and preventing epidemics.

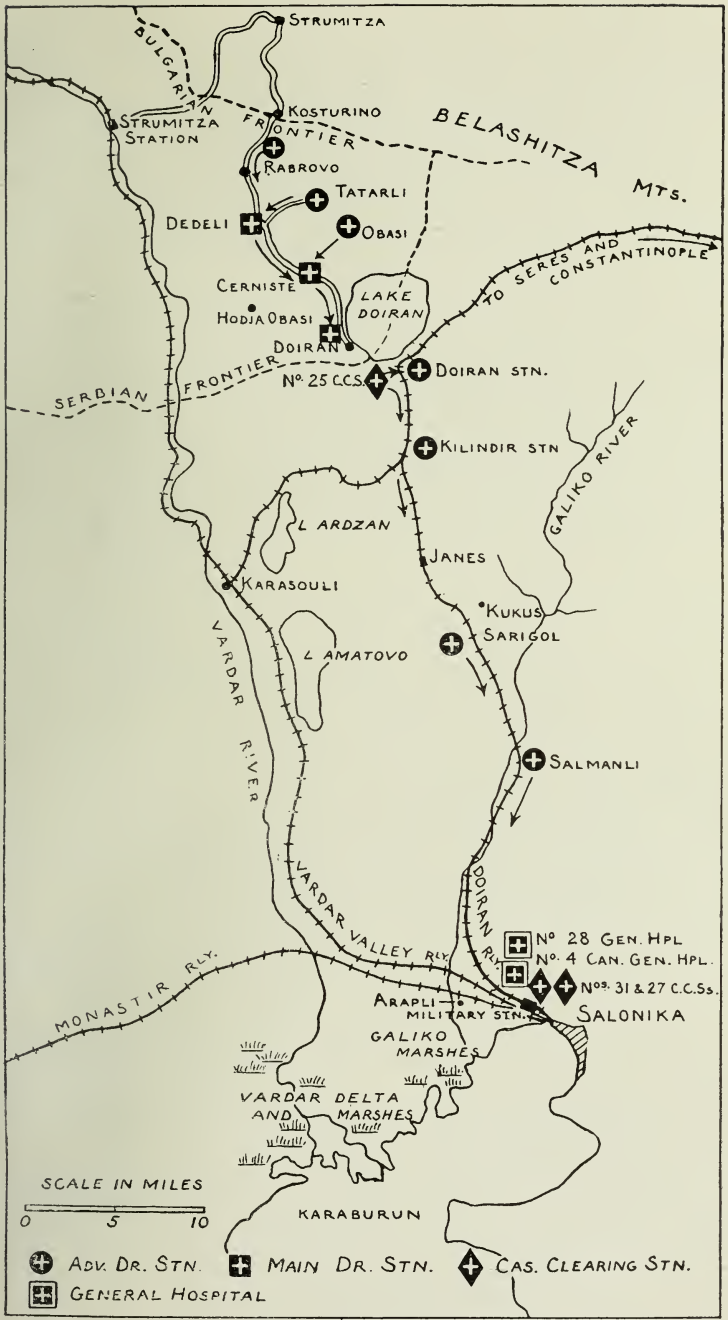
CHAPTER IV.

THE MEDICAL SERVICES DURING THE BATTLES OF THE BRITISH SALONIKA FORCE.

THE active operations in Macedonia so far as the British Salonika Force was concerned were of the nature of minor actions and raids during 1915 and 1916; but in 1917 a combat of the magnitude of a battle took place on the Doiran front, and in 1918 there was a similar battle leading to decisive victory over the enemy and the pursuit into Bulgaria.

The Withdrawal from Serbia.

When the orders were issued for the withdrawal of the 10th Division from Serbia in December 1915, special preparations were made for the collection and evacuation of the wounded. At that time the three field ambulances of the division, Nos. 30, 31 and 32, were opened along the road to Kosturino, north of Lake Doiran, and in the hills east of the road. A casualty clearing station, No. 25, was under canvas on a low hill near the south-west corner of the lake and about one and a half miles from Doiran station, to which the Doiran–Kosturino road ran. There was, however, no road thence to Salonika with the exception of unmetalled tracks. The railway line was a single line under control of the Greeks. The field ambulances, however, had three motor ambulance cars each, although all but two of No. 30 and two of No. 31 were out of action. The casualty clearing station had its motor lorries. All this motor transport had been brought up to the Doiran front by rail. The problem that confronted the D.M.S. was how to get the casualty clearing station and the motor transport back by railway during the retreat without loss, and at the same time not only to provide for bringing the wounded of the rearguard action back to the railway line, but also to arrange for the reception and evacuation of sick and wounded during the march of the troops along the tracks from Doiran to Salonika. Further, the brigade of the 22nd Division, sent up to the Doiran front in support of the 10th Division, had to be accompanied by a field ambulance, and, as the transport and equipment of the 22nd Division field ambulances had not arrived, transport and equipment had to be hurriedly found for this purpose. The bearer



SKETCH MAP OF THE MEDICAL POSTS DURING THE WITHDRAWAL OF THE 10TH DIVISION FROM SERBIA, DEC., 1915.

division and a tent sub-division of No. 66 Field Ambulance were thus sent up equipped with seventy-six stretchers and six wheeled stretcher carriers but no other transport.

The other casualty clearing stations then in Salonika were No. 40 in camp with the 22nd Divison, near Arapli, south of the Monastir road and railway, and Nos. 27 and 31 C.C.Ss. in camp north of the road, near the military railway station, about three-quarters of a mile nearer Salonika than the general hospital.

The preparations, consequently, were as follows :—No. 25 C.C.S. was closed and brought back to the Monastir road sites near Nos. 27 and 31 C.C.Ss. and parked there ; but the officer commanding was instructed to obtain two large store tents and open a rest station at Doiran railway station to which the sick and wounded were to be brought and entrained under his supervision. He was to remain there until all the troops had withdrawn and then come back to Salonika by train. No. 30 Field Ambulance of the 10th Division was to take over a Greek school on the shore of the lake at Doiran village, to which all the sick and wounded forward of the village were to be brought, and thence evacuated to the railway station, the lighter cases by ambulance car along the road, and the stretcher cases in the lake boats. These boats were light coracles capable of taking one stretcher each and a sitting case or attendant.* On a calm day a smooth and comfortable journey across the lake to the railway station could thus be made. The remaining field ambulances were between five and six miles farther north on the Kosturino road. They were to be withdrawn with the troops. Their transport and such equipment as could only be carried on wheeled transport were entrained at Doiran for Salonika. In the event of wounded having to be collected after the transport had been withdrawn arrangements were made for hand carriage by a system of relays to the railway station. The Greek ambulance train coaches, fitted with Linxweiler frames for stretchers, were to be used for the casualties, two passenger coaches being added for sitting-up cases.

No. 30 Field Ambulance remained till the last of the troops had retired, and was then entrained.

The sick and wounded were to be received in Salonika at the military station, on the Monastir road, or at the Constantinople terminus, by detachments from No. 27 C.C.S., and

* See Chapter XXIII, pp. 652–3.

No. 31 C.C.S. Except urgent cases, which were to go direct from the railway station to the general hospital, all patients were to be dealt with in these casualty clearing stations, classified there, and distributed to the general hospitals.

For the reception of sick and wounded during the march back from Doiran to Salonika, the D.M.S. arranged, in consultation with the D.A.G. and Q.M.G., to form a series of medical posts at the stations along the line of railway, each manned by one medical officer, a N.C.O. and five men, one of whom was to be a cook and one a nursing orderly, with an equipment of four bell tents, medical, surgical and ordnance stores. Ambulance coaches were to be attached to the supply trains bringing rations up to these stations, and as the troops retired, each medical post was to be closed and go back with the sick and wounded by train to Salonika. Three such posts were established, namely, at Kilindir, 6 miles from Doiran; Sarigol, 13 miles from Kilindir; Salmanli, 9 miles from Sarigol. The last stage of the journey was from Salmanli to Salonika, a distance of 18 miles.

The withdrawal from Serbia was completed successfully, and the troops began to arrive in Salonika on the 12th December 1915.

These medical arrangements worked remarkably well, and there was no loss of personnel or equipment, except one ambulance car which broke down on the Kosturino road and had to be abandoned. Hot food and drink were ready at all the posts from Doiran railway station to the terminus stations at Salonika. About 300 sick and wounded light cases arrived at the base on the evening of 8th December. They had been brought down comfortably by rail lying on hay and straw on the floors of the goods vans, a method which was preferred to that of placing them on stretchers on the frames, or of sitting up in the passenger coaches.

Actions on the Doiran Front in 1916.

When the British divisions took over the Struma Valley front from the French in the summer of 1916, and had advanced along the Salonika–Doiran railway line to the areas south of the Doiran Lake and westwards to Lake Ardzan, the Italian Division on the Krusha Balkan separated the Struma front from the Doiran front. The 28th Division which had been transferred from the XIIth to the XVIth Corps was on the Italian right. The XIIth Corps, on the Doiran front, then consisted of the 22nd and 26th Divisions. The XVIth Corps on

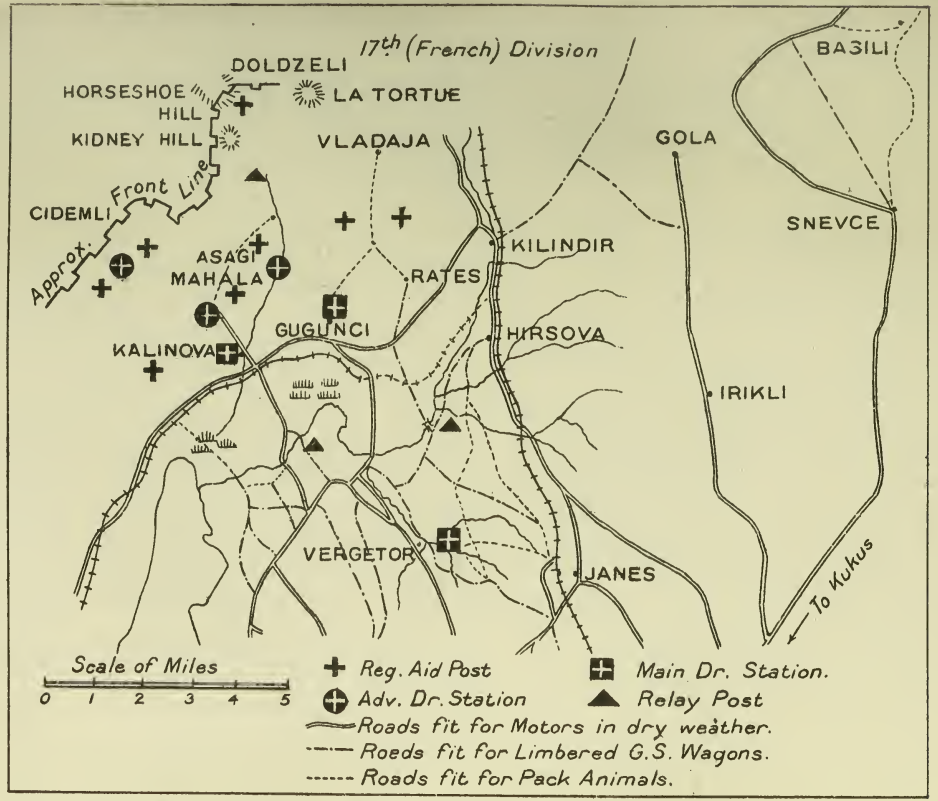
the Struma front consisted of the 27th, 10th and 28th Divisions. The first two of these divisions were on the right from the sea to the Seres road, while the 28th Division occupied the Struma Valley front from north of the Seres road to Lozitsa, on the Butkova Lake.

The 22nd and 26th Divisions took over respectively the areas east and west of the Doiran–Salonika railway line in support of the 17th French Division. At first the former division only advanced to about five or six miles north of Sarigol railway

A dressing station on the Doiran front.

station, with its headquarters at Kukus. The 26th Division took up a position on the left of the French Division, and a combined attack on the enemy was made between the 10th and 18th August by the 17th French and 26th British Divisions, resulting in the French troops securing La Tortue Hill about one and a half miles south of Doiran village, and the British the main ridge known as Kidney Hill and Horseshoe Hill about one and a half miles west of La Tortue. During this action the headquarters of the 26th Division was at Vergetor.

The attack which led to the capture of Horseshoe Hill by the division took place during the night of the 17th/18th August.



MAP OF THE DOIRAN FRONT SHOWING THE DISPOSITION OF 26TH DIVISION MEDICAL UNITS AND ROAD COMMUNICATIONS IN AUGUST 1916.

1326.

Malby & Sons, Lith.

Dressing stations were formed for the right sector of the attack at Gugunci, with an advanced dressing station in a ravine near Asagi Mahala, and for the left sector at Kalinova, with an advanced dressing station about half a mile south-west of Cidemli. The casualties were five officers and fifty-three other ranks wounded. They were all taken on travois, cacolets and wheeled stretchers to the advanced dressing stations of the right sector, and thence by the light ambulance wagons to the main dressing station at Gugunci. From Gugunci evacuation under the control of the D.D.M.S. of the Corps was by No. 17 M.A.C. to Janes, where Nos. 28 and 31 C.C.Ss. had been opened.

Immediately after these operations the 22nd Division was moved up to the left of the 26th Division and occupied the area between it and the Vardar river, north of Lake Ardzan. On the 13th to 14th September it attacked the enemy salient, Piton des Mitrailleuses, north of Machukovo, to assist Allied operations west of the Vardar. The operations were successful, but owing to strong counter-attacks and difficulty on account of the rocky nature of the ground to consolidate the new positions the troops withdrew to their original line.

During these operations a main dressing station was formed by No. 66 Field Ambulance of the 22nd Division a mile south-west of Oreovica, on the Smol-Karasouli road, with an advanced dressing station in Smol Church. No. 67 Field Ambulance was in reserve near the main dressing station. No. 68 Field Ambulance was in the division's right sector with a main and advanced dressing station, but was outside the area of the action.

Malaria had broken out among the troops and, in addition to the collection and evacuation of wounded, provision had to be made for a large number of sick. During the periods 10th to 20th August and 13th to 17th September, 1916, 1,549 and 1,663 sick respectively were admitted to the field ambulances of the 22nd and 26th Divisions, as compared with 193 and 463 wounded, as shown in the tables.

The nature of the country presented great difficulties. The terrain from the front line to the advanced dressing stations was exposed to shell fire, and wounded had consequently to be collected to the latter before daylight. All the stretcher bearers of Nos. 66 and 67 Field Ambulances were employed. Collecting posts, where the wounded could be placed rapidly on the mule ambulance transport, were formed as far forward as possible. The road from the advanced dressing station to the main dressing station was also exposed to shell fire, and the wheeled horse transport employed on it could only be used at night. During

Doiran Operations, 1916.
Action of Horseshoe Hill, 10th to 18th August.

Date.	22nd Division.				26th Division.			
	Sick.		Wounded.		Sick.		Wounded.	
	Adm.	Evac.	Adm.	Evac.	Adm.	Evac.	Adm.	Evac.
10th August	42	49	—	—	62	48	—	—
11th ,, ...	59	53	1	1	64	70	2	—
12th ,, ...	57	47	2	—	59	52	3	4
13th ,, ...	85	102	5	6	43	39	9	6
14th ,, ...	75	75	3	2	81	72	3	2
15th ,, ...	72	73	4	4	74	58	1	1
16th ,, ...	80	82	7	7	62	59	8	7
17th ,, ...	73	69	—	—	100	72	14	11
18th ,, ...	57	52	16	16	94	87	12	9
19th ,, ...	101	103	2	1	90	99	59	55
20th ,, ...	64	57	3	1	55	49	39	39
Total ..	765	762	43	38	784	705	150	134

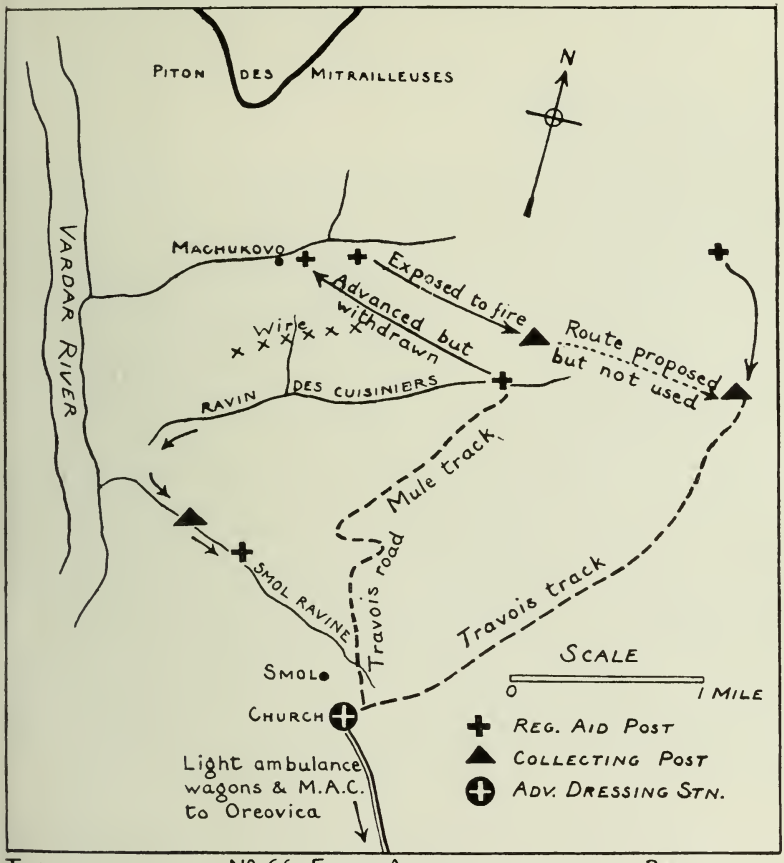
Action of Machukovo, 13th to 14th September.

Date.	22nd Division.				26th Division.			
	Sick.		Wounded.		Sick.		Wounded.	
	Adm.	Evac.	Adm.	Evac.	Adm.	Evac.	Adm.	Evac.
13th September	293	250	9	9	88	88	7	8
14th ,, ...	254	305	58	60	104	90	5	5
15th ,, ...	219	201	325	292	105	100	3	3
16th ,, ...	197	190	22	47	95	97	4	4
17th ,, ...	190	198	15	16	118	99	15	15
Total ..	1,153	1,144	429	424	510	474	34	35

daylight mule travois and wheeled stretchers were sent along it one at a time. The advanced dressing station at Smol was shelled on the 14th September, casualties occurring amongst the personnel. Wounded in it were removed to a neighbouring ravine and dugouts. When it was decided to retire to the original line a bearer sub-division of No. 68 Field Ambulance and all available mule transport were sent to assist No. 67 Field Ambulance, and all available motor ambulance cars

were sent up after dark to Smol. They proved invaluable. Search parties went out at night to the ground over which the retirement took place, and a few wounded were brought back from ravines near the enemy trenches.

The main dressing station was cleared by motor ambulance



THE POSITIONS OF No. 66 FIELD AMBULANCE AT THE BATTLE OF MACHUKOVO, SEPTEMBER 1916

convoy to railhead at Karasouli, to which place No. 28 C.C.S. had previously been transferred from Janes.

This was the first occasion on which large numbers of wounded had to be brought back rapidly by the pack transport, improvised for this purpose in the winter of 1915–16. Cacolets, which were used both on mules and horses, were more satisfactory than had been anticipated for the conveyance of sitting-up

cases. The experience of the stretcher cases was that they were more comfortably conveyed on travois than in ambulance wagons. The travois, however, were apt to get entangled in signal wires when these were laid on the tracks. Litters

Mountain road, Macedonia.

carried between two mules were not so satisfactory as the travois. They required more attention and management and were in consequence little used. Wheeled stretchers drawn by mules were an excellent form of ambulance transport wherever the tracks permitted their being employed.

Actions in the Struma Valley in 1916.

During, and immediately after, these operations by the British XIIth Corps divisions on the Doiran–Vardar front, the XVIth Corps commenced active hostilities against the Bulgars in the Struma Valley. Its divisions then consisted of the 27th, 7th Mounted Brigade, the 10th and 28th Divisions, holding a line from the sea at Stavros to the mouth of the Struma river and thence to Lake Tahinos and along the Struma Valley to Lake Butkova. On the 9th/10th September the

Collecting post with travois and cacolets, Macedonia.

three divisions tested the strength of the enemy's defences in villages east of the Struma, and then withdrew to their positions on the left bank. This was followed by raids and a general attack across the river on the 20th September against the villages of Karadzakoj-bala and Karadzakoj-zir by a brigade of the 27th Division, followed by continued attacks by the 27th and 10th Divisions until the 4th October. Positions in villages east of the Struma were captured, more especially north and south of the Seres road and between it and Lake Tahinos, thus enlarging and securing the bridgehead opposite Orliak. At the end of October attacks were resumed against the

enemy, more especially by the 28th Division in the direction of Demirhissar and the Rupel Pass, as a result of which the British line during the winter of 1916–17 ran on the left bank of the Struma from Lake Tahinos and Osman–Kamila through Jenikoj on the Seres road to Alipsa about seven miles south of the entrance to the Rupel Pass, and the same distance west of Demirhissar.

During these operations from the end of September to the end of October, the XVIth Corps main line of evacuation from the Struma Valley was by the Seres road. The 2/1st and 2/3rd Northumbrian Field Ambulances had been placed at the disposal of the D.D.M.S. of the Corps, but they were only semi-mobile and were consequently used as casualty clearing

Ambulance wagons in the Struma Valley.

stations. The former was placed at Stavros and five nursing sisters were sent for duty in it. It relieved No. 83 Field Ambulance of the 27th Division, which then rejoined, at Tasli on the coast of the Gulf of Orfano, a brigade of the division which occupied the sector between Lake Tahinos and the mouth of the Struma. The 2/3rd Northumbrian Field Ambulance was placed on the Seres road near the Struma Valley to act as an advanced casualty clearing station. No. 27 C.C.S. was then at Lahana, farther back, No. 40 C.C.S. at Guvesne, and No. 25 C.C.S. at the junction of the Akbunar–Seres road, with detachments as aid posts at half-way points between No. 27 and No. 40 C.C.S. and between No. 40 and No. 25 C.C.S.

The number of sick and wounded admitted to the medical units during these operations in the Struma Valley between the 30th September and 4th October is shown in the following table.

Operations in the Struma Valley, 1916.

XVIth Corps. Actions of the Karadzakojs, 30th September to 4th October.

Unit.		Sept. 30.		Oct. 1.		Oct. 2.		Oct. 3.		Oct. 4.		Oct. 5.		Oct. 6.	
		Admit.	Evac.	Admit.	Evac.	Admit.	Evac.	Admit.	Evac.	Admit.	Evac.	Admit.	Evac.	Admit.	Evac.
7th Mounted Brigade	Sick ..	58	74	12	—	23	12	13	26	7	8	11	—	14	13
	Wounded	—	—	4	—	—	2	—	—	—	—	—	—	—	—
10th Division ..	Sick ..	113	101	77	79	63	62	112	113	141	139	55	39	102	102
	Wounded	—	—	209	209	162	149	60	57	84	80	206	212	86	85
27th Division ..	Sick ..	122	80	77	137	113	42	63	274	77	81	67	86	98	106
	Wounded	—	—	—	1	—	—	—	—	127	114	31	41	4	6
28th Division ..	Sick ..	235	227	100	108	78	17	118	107	121	124	98	101	111	102
	Wounded	1	1	20	16	3	5	10	6	69	66	4	4	—	—

Total sick admitted =2,279; total sick evacuated = 2,360.
,, wounded ,, =1,081; ,, wounded ,, = 1,052.

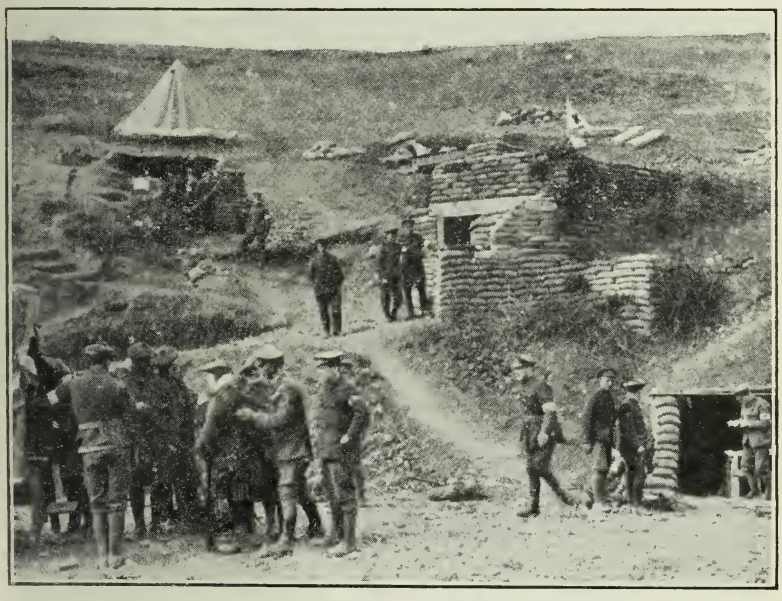
On the 30th September the A.D.M.S. of the 10th Division established an advanced dressing station with No. 32 Field Ambulance, at Sakavca, on the right bank of the river, and sent No. 31 Field Ambulance across the river to form an advanced dressing station at Karadzakoj village, and No. 30 Field Ambulance to form a similar post at the river crossing at Komarjan, thus establishing a chain of posts back to Sakavca. The wounded were brought back by hand and by mules with litters and travois to a main dressing station of No. 32 Field Ambulance on the Seres road near Gerazanli. The mules were led by Macedonian and Cypriot muleteers who did well.

Canteen and supper bar run by No. 30 Field Ambulance in the Struma Valley.

Although a brigade of the 27th Division took part in the operation in conjunction with the brigade of the 10th Division, only the bearers of one of its field ambulances, No. 81, were employed, as the wounded were brought to the posts and main dressing station established by the 10th Division field ambulances. But on the 2nd October a section of No. 82 Field Ambulance of the 27th Division arrived at Mekes, near Sakavca, and on the following day its transport was attached to No. 81 Field Ambulance and took over the evacuation of wounded to Sakavca from the right sector of the fighting. The 7th Mounted Brigade Field Ambulance formed posts on the right at the villages of Kopaci, Apidji, Gudeli and Suhabanji; and after

the occupation of the villages east of the Struma by the infantry, they went forward to Orliak and Komarjan bridge, returning on the 14th October to Kopaci.

The 28th Division, during these operations, formed an advanced dressing station at Orliak, with a post at the bridge and a main dressing station on the Seres road, near that of the 10th Division, for its right wing, and a main dressing station on the Lahana–Torica road, with an advanced dressing station about six miles farther in advance, and at Gumus Dere near the village of Kopriva, for its left wing.

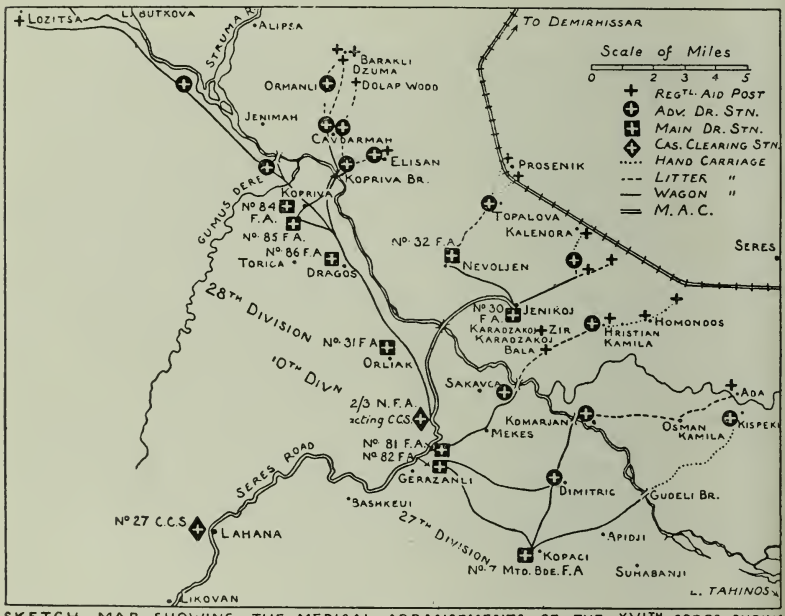


An advanced dressing station, Macedonia.

The evacuation of the wounded along the Seres road to the base was carried out by No. 7 M.A.C. reinforced with ambulance cars from No. 17 and No. 32 Motor Ambulance Convoys. These convoy cars carried the lying cases back to No. 27 C.C.S. at Lahana, and, after resting there, to No. 40 C.C.S. at Guvesne, whence they were carried under Line of Communication arrangements to the base. Sitting cases were sent back by lorries to Likovan where they had a rest at the half-way aid post, and then on to No. 25 C.C.S. at the base. The lorries were bedded with straw and palliasses. These arrangements worked smoothly, but it was found that serious

cases travelled badly along the Seres–Salonika road and it was arranged that certain of them, such as those with head, abdominal and chest wounds, should be retained at the advanced casualty clearing stations. At this period the broad gauge and Decauville railway lines had not come into use for wounded and sick, and the whole journey back to the base had to be made by road.

During the operations of the 31st October in the direction of Demirhissar and the Rupel Pass, the 28th Division Headquarters were at Torica, overlooking the Struma Valley, and



SKETCH MAP SHOWING THE MEDICAL ARRANGEMENTS OF THE XVITH CORPS DURING THE OPERATIONS IN THE STRUMA VALLEY, OCTOBER 1916

the village of Kopriva, on the right bank of the river. Bridges were thrown across the river at Kopriva and Jenimah, and advanced dressing stations were placed at Ormanli and Cavdarmah villages, on the left bank opposite the bridges, with an advanced dressing station at Kopriva bridge and a post at Jenimah. The main route back for wounded was by the Kopriva bridge. The troops advanced and occupied Dolap wood and Barakli Dzuma. Aid posts were then established in houses in the village and in a farm in the wood, and the field ambulances pushed up their bearers with mules, litters and cacolets from Cavdarmah and Ormanli to them. The wounded

were brought back from Barakli Dzuma to the advanced dressing stations at Ormanli and from Dolap wood to the advanced dressing station at Cavdarmah. Thence they were evacuated to Kopriva bridge advanced dressing station. There was also some fighting on the right at Elisan where a field ambulance post had been established, and wounded from there were also brought to Kopriva bridge.

The field ambulances employed in the areas east of the river were No. 85 and No. 86. The former had its main dressing station in Kopriva village and supplied the posts at Kopriva bridge, Elisan and Cavdarmah. No. 86 formed a main dressing station at Dragos between Kopriva and Orliak, and also formed the advanced dressing station at Ormanli and the post at Jenimah bridge. The wounded were brought by mule transport from Ormanli to Cavdarmah and from Cavdarmah to the main dressing station at Dragos by ambulance wagons of No. 86 Field Ambulance. Mule transport of No. 85 Field Ambulance also brought wounded from Cavdarmah to its advanced dressing station at Kopriva bridge and thence by its ambulance wagons to the main dressing station in the village. From both main dressing stations the wounded were evacuated to the 2/3rd Northumbrian Field Ambulance which had been established as a casualty clearing station on the Seres road, near Orliak. Ten ambulance wagons had been placed at the disposal of the 28th Division for this purpose from the 10th Division on its right.

Both the 10th and 27th Divisions and the 7th Mounted Brigade were also engaged at the time when the 28th Division launched the main attack. The 10th Division had an advanced dressing station at Topalova, with a main dressing station at Nevoljen, whence wounded were taken by ambulance wagons to a post on the Seres road near Jenikoj. A second advanced dressing station of the 10th Division was placed about three-quarters of a mile south of Kalendra, a station on the railway line between Demirhissar and Seres, with a main dressing station in the village of Jenikoj. Wounded were carried by hand to the Topalova advanced dressing station, thence by mule transport to the Seres road and to the main dressing station at Jenikoj. Thence they were evacuated to the 2/3rd Northumbrian Field Ambulance by No. 7 M.A.C.

The 27th Division and 7th Mounted Brigade were occupying the area south of the Seres road, with an advanced dressing station at Hristian Kamila and Komarjan Bridge, formed by the 27th Division field ambulances, and at Kispeki by the

7th Mounted Brigade. From Hristian Kamila mule transport brought the casualties to a bridge known as "Gun" bridge; they were carried across this by bearers and then loaded on to ambulance wagons which took them to a main dressing station of the 27th Division on the Seres road, near Gerazanli. From the advanced dressing station at Komarjan bridge and Kispeki wounded were carried by mule transport to the right bank of the river, and thence by ambulance wagons to Dimitric, where a section of No. 82 Field Ambulance of the 27th Division received them and passed them on by a second relay of wagons to the main dressing station on the Seres road.

Sick and wounded were sorted out at the 2/3rd Northumbrian Field Ambulance, lighter cases being sent back by motor lorry to No. 25 C.C.S. at the base, through the rest station at Likovan, and stretcher cases by No. 17 M.A.C. to No. 27 C.C.S. at Lahana. The main dressing stations of the 27th Division, on the Seres road, were also cleared to No. 27 C.C.S. by a section of No. 7 Motor Ambulance Convoy. The wounded in No. 27 C.C.S. were evacuated to No. 40 C.C.S. at Guvesne by the remaining sections of No. 7 M.A.C. The staff of No. 27 C.C.S. was reinforced during the fighting by a surgical group of three medical officers, five nursing sisters and ten orderlies. An advanced depôt of medical stores and a bacteriological laboratory were also at Lahana alongside the casualty clearing station. The general medical situation during these operations by the XVIth Corps is shown on the map.

The weather was bad and transport was hampered by the muddy state of the ground and roads in the Struma Valley. The number of casualties was fortunately slight; only 116 wounded in the 28th Division, 56 in the 10th Division and 52 in the 27th Division, were admitted to the main dressing stations between the 31st October and 3rd November 1916.

Subsequent to these operations the Italian division was withdrawn from the Krusha Balkan and the British force took over at the end of November 1916, as mentioned in Chapter II, a continuous front of 90 miles from the mouth of the Struma to the Vardar, the area between the XVIth Corps and the XIIth Corps, previously occupied by the Italian division, being held by the 28th Division extending westwards from the Struma Valley and the 228th Infantry Brigade eastwards from Lake Doiran. During the winter 1916–17 an offensive spirit was maintained amongst the troops; several raids on the enemy's lines were carried out and losses inflicted on him. Great improvements, by which the medical services benefited,

were effected to facilitate transport, especially by the construction of Decauville field railways along the Struma Valley from Kopriva to Orliak ; from near Likovan to Mirova, in the Krusha Balkan ; from Snevce to Kukus and Sarigol ; and on the Doiran front from near Gugunci to Janes to connect the Kilindir–Vardar valley line with the Kilindir–Salonika line. Decauville lines were also constructed from Tasli near the mouth of the Struma along the coast of the Gulf of Orfano to Stavros, and from Stavros Bay through the Rendina Gorge and along the southern shores of Lakes Beshik and Langaza,

A field ambulance dressing station in Macedonia.

to the vicinity of Guvesne where a broad gauge line had now been extended from Salmanli on the Doiran railway and linked up Guvesne with the base.

The Battle of Doiran 1917.

The battle which was fought on the Doiran front by divisions of the XIIth Corps took place on the 24th and 25th April 1917, and was resumed on the 8th and 9th of the following month. The divisions engaged on the night of the 24th and 25th April were the 26th and 22nd Divisions, with subsidiary actions by the 60th Division on the Machukovo front, east of the Vardar

river. Two brigades of the 26th and one of the 22nd Division attacked the enemy's advanced line from the western shores of Lake Doiran to the crest of what was known as the "P" ridge, north-east of Krastali village. A ravine, the Jumeaux ravine, ran from the "P" ridge eastwards along the front to enter Lake Doiran about 1,500 yards south of Doiran village, with several short subsidiary ravines running into it from the south and one of greater extent, known as the Urjlye valley, from the north-west. Another extensive ravine, the Vladaja ravine, ran from the "P" ridge to the east of the Horseshoe and Kidney Hill, past Doldzeli village in a south-easterly direction to Vladaja. Several branch ravines, some of considerable length, ran into it. Immediately south of Doiran railway station the great Dobrovica Valley, with its many tributaries, ran due south to Kilindir and thence to Lake Ardzan. During the battle these ravines and valleys played an important part in the medical scheme of evacuation of wounded.

The 26th Division reached its objectives, but owing to the heavy barrage of shrapnel and high explosive shells put down along its right front it had to withdraw to its original line. The 22nd Division gained its objective and consolidated new positions with comparatively little opposition, but was subjected to several counter-attacks on the night of the 24th/25th April and on the two succeeding nights.

The medical arrangements during the battle were as follows:—

26th Division.

Right Sector.—Advanced Dressing Station about half a mile south of Doiran Lake where the road from Kilindir to Doiran crosses the Jumeaux ravine.

Main Dressing Station about one and a half miles north-west of Kilindir.

Left Sector.—Advanced Dressing Stations :—

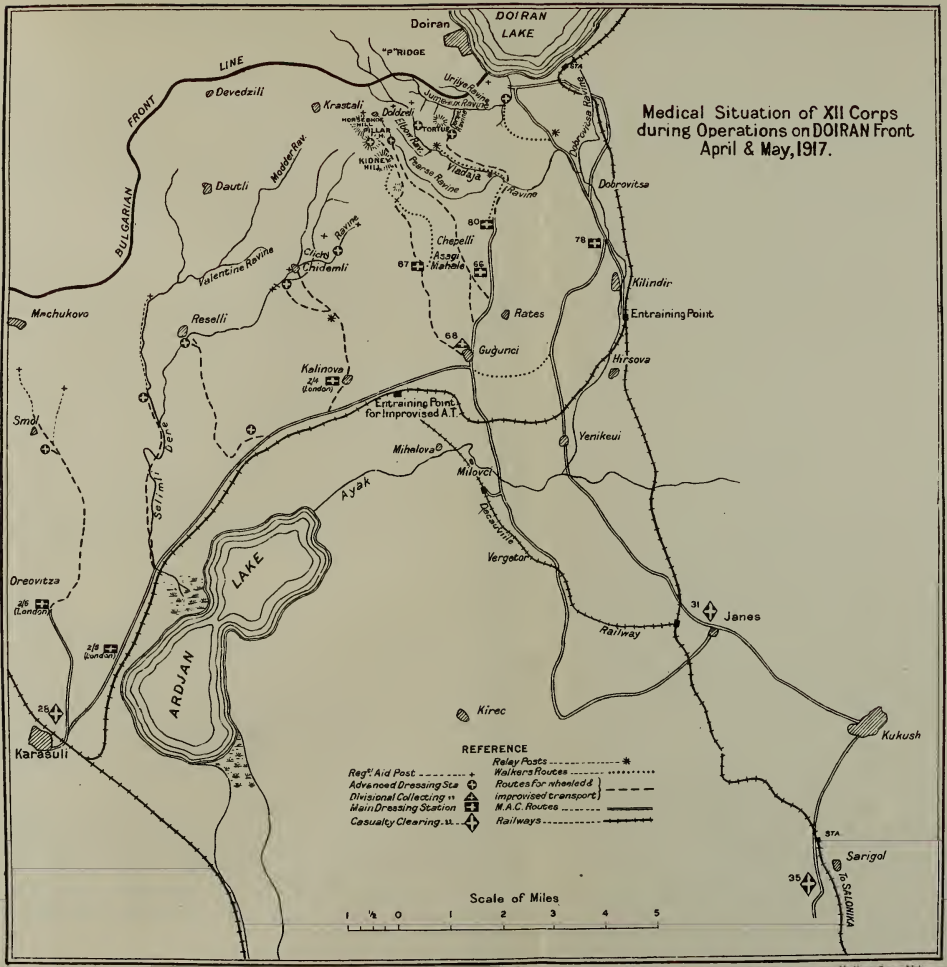
(*a*) About half a mile south of the centre of the Jumeaux ravine and between it and the Vladaja ravine.

(*b*) In a small ravine, Christmas ravine, entering the Vladaja ravine about 1,200 yards west by north of (*a*).

Main Dressing Station on the south slope of the Rates ridge, about one and three-quarter miles south of (*a*).

The three advanced dressing stations were approximately 1,000 yards from the enemy lines; the two main dressing stations about 3,000 yards farther back. The wounded were brought by hand carriage to the advanced dressing stations. From the right sector advanced dressing station evacuation

To face page 132.



could only take place before daylight along the Kilindir road by ambulance wagons or Ford ambulance cars, of which seven were placed at the disposal of the A.D.M.S. An alternative road by Doiran station road to Kilindir was also suitable for wheeled transport. It was, however, more exposed than the direct road from Doiran village to Kilindir. On the left sector hand carriage was also employed to the advanced dressing stations, whence to the main dressing station wounded were conveyed by ambulance wagons during the night. During daylight mule transport with litters, travois and cacolets were employed in clearing the advanced dressing stations of both sectors. No. 78 Field Ambulance formed the right sector advanced dressing station and main dressing station. The ground over which it worked was easier, the road better and the distances shorter than in the left sector, the advanced dressing stations and main dressing station of which were formed by No. 80 Field Ambulance. Consequently, No. 80 Field Ambulance had attached to it all the available personnel and transport of No. 79 Field Ambulance. Most of the work fell on No. 80 Field Ambulance and a considerable number of its personnel were wounded. The enemy, however, is stated to have interfered little, if at all, with the collection of the wounded, many of whom were picked up without molestation near the enemy's wire. No difficulties arose in connexion with the evacuation of the advanced dressing stations by ambulance wagons and cars during the night.

22nd Division.

Right Sector.—Advanced Dressing Station of No. 66 Field Ambulance in a ravine (Pearse ravine) about 1,000 yards south-east of Kidney Hill.

Main Dressing Station about one and three-quarter miles north of Gugunci on the road from Pearse ravine.

Left Sector.—Advanced Dressing Station of No. 68 Field Ambulance at Pillar Hill, between Kidney Hill and Horseshoe Hill.

Main Dressing Station near Asagi Mahali.

The advanced dressing stations were constructed of splinter-proof material. Each accommodated about fifty patients on stretcher racks in tiers. They were placed near the main tracks and were connected by communication trenches with the regimental aid posts, which were about 1,000 yards

nearer the front line. These aid posts were also splinter-proof constructions with accommodation for eighteen to twenty patients on the stretcher racks. Carriage from them to the advanced dressing stations was by hand.

The main dressing stations were equipped with operating theatres, wards and nursing staff. The wounded were brought to the right sector main dressing station by mule transport to a relay post about 1,000 yards south of the advanced dressing station, and from there by ambulance wagons. On the left sector litters, travois and cacolets had to be used for the whole distance back to the main dressing station, where special accommodation was provided for patients unfit for further transport. Wounded were evacuated by light ambulance wagons day and night from the main dressing stations to a large divisional collecting centre established at Gugunci under the officer commanding No. 68 Field Ambulance with a staff of six medical officers and a large number of other ranks from the field ambulances. This collecting centre had accommodation for 100 casualties in buildings and 424 in tents and marquees, and here reserve transport was also kept.

60th Division.

The 60th Division, during the subsidiary action east of the Vardar, had an advanced dressing station at Smol church, in Selimli Dere, and near Reselli, with main dressing stations at Oreovica and Kalinova. The casualties were, however, comparatively few on this front.

Evacuation from the divisional main dressing stations and the collecting centre at Gugunci was under the control of the D.D.M.S. of the XIIth Corps. Eight ambulance trains of five trucks for twenty-four sitting and twenty-four lying patients with a truck for kits were organized to run along the Decauville line at fixed hours during the day from the Milovci station on the Kilindir–Karasouli railway to Janes. Each had a staff of one medical officer and eight other ranks. The journey from Milovci to Janes took about forty minutes.

On the broad gauge lines between Kilindir and Janes and between Gugunci and Karasouli ambulance trains were improvised to carry 80 sitting cases in two third-class coaches, 160 sitting cases in eight trucks, 12 lying cases on stretcher frames, and 38 lying cases on stretchers on the floor of seven other trucks. Each improvised train could thus carry 290 patients. These trains were prepared from the supply trains after the latter had unloaded at Hirsova, just south of Kilindir.

One of the trains was intended to bring the wounded admitted to the main dressing station of the 26th Division right sector from Kilindir to Janes, Sarigol and Salonika, detraining the stretcher cases for No. 31 and No. 35 C.C.S. at Janes and Sarigol, and taking the sitting cases on to the military station near No. 28 General Hospital on the Monastir road. Another improvised train was to run from Gugunci station to Karasouli and the military station on the Monastir road for wounded from the left sector of the 26th Division and from the 22nd Division, detraining the stretcher cases at Karasouli for No. 28 C.C.S. Each improvised train had a staff of one medical officer and eleven other ranks.

The journey from Kilindir to the base took three hours, and from Gugunci about four and a half hours; but from both railheads to the casualty clearing stations was only half an hour. The wounded went from the main dressing stations to the entraining stations by ambulance car and lorry, or on foot, at fixed hours, and the number of sitting and lying cases sent to be entrained was regulated to suit the capacity of the trains.

Evacuation from the 60th Division main dressing station at Kalinova was also provided for by the improvised train running to Karasouli, and by an extra train on the Milovci–Janes line. The casualty clearing stations at Janes and Karasouli were cleared by the regular ambulance trains to the base.

The improvised trains were run only during the night. During the day evacuation was carried out by the trains on the Decauville line from Milovci to Janes. Serious cases requiring urgent evacuation from main dressing stations at Gugunci, Rates and Kilindir, after the departure of the improvised trains, were taken to No. 31 C.C.S. at Janes by motor ambulance car. No. 17 M.A.C. was employed for this purpose and for general transport work between the dressing stations and entraining points and between the detraining stations and the casualty clearing stations at Karasouli and Janes. Its headquarters, with twenty-four cars, were at Milovci, ten were at Karasouli and thirteen at Janes. The seven cars placed at the disposal of the 26th Division were also from this convoy. Five lorries from the convoy and the casualty clearing stations, each carrying twenty sitting cases, were also employed.

The number of sick and wounded admitted to and evacuated from the field ambulances during the battle of the 24th/25th April and subsequent days in April was 2,521 wounded admitted and 2,451 wounded evacuated, and 1,089 sick admitted and 1,005 evacuated, as shown in the following table. By far the greater number were wounded by shell and shrapnel.

Battle of Doiran, 1917.

Sick and Wounded admitted to and evacuated from Field Ambulances of the XIIth Corps during operations, 24th to 25th April and 8th to 12th May 1917.

Date.	22nd Division.				26th Division.				60th Division.			
	Sick.		Wounded.		Sick.		Wounded.		Sick.		Wounded.	
	Admit.	Evac.	Admit.	Evac.	Admit.	Evac.	Admit.	Evac.	Admit.	Evac.	Admit.	Evac.
April 23	42	31	7	—	26	37	14	1	59	29	10	8
,, 24	67	88	13	7	57	40	51	32	32	40	11	9
,, 25	74	86	85	72	50	37	815	280	51	39	63	56
,, 26	42	27	305	265	19	46	639	911	29	38	39	38
,, 27	51	55	86	96	25	8	76	312	18	25	3	6
,, 28	77	68	83	120	34	25	32	53	42	29	2	3
,, 29	96	82	83	57	26	32	39	39	37	21	1	1
,, 30	52	58	59	77	36	22	4	7	47	42	1	1
May 8	74	57	16	19	40	20	24	7	37	29	3	8
,, 9	93	121	64	15	32	51	567	423	33	33	20	2
,, 10	56	72	20	66	27	33	596	736	26	21	6	21
,, 11	106	28	13	11	78	26	38	26	42	17	17	8
,, 12	74	91	6	5	49	42	30	22	36	32	8	16

23rd to 30th April, total sick admitted = 1,089 ; total wounded admitted = 2,521.
,, ,, evacuated = 1,005 ; ,, ,, evacuated = 2,451 (including 5 gassed).
8th to 12th May, ,, ,, admitted = 803 ; ,, ,, admitted = 1,428.
,, ,, evacuated = 673 ; ,, ,, evacuated = 1,385.

The 22nd Division had one officer and eighteen other ranks, and the 26th Division one officer and twenty-six other ranks of their field ambulance personnel wounded.

The allied operations on the right bank of the Vardar river and in the vicinity of Monastir were postponed owing to climatic and other reasons, and, consequently, the battle on the British front which had been undertaken in support of the Allies was interrupted until the 8th May. It was then resumed, but on this occasion it was restricted to the sector between Lake Doiran and the Petit Couronné hill immediately to the west of the lake, in the right sector front of the 26th Division, combined with a general attack on a front of two miles along the western slopes of Horseshoe Hill ridge and against Goldies' Hill, a hill 2,000 yards south of the village of Devedzili. The attack on the Petit Couronné was successful in so far that the British troops established themselves on its slopes. It was, however, found impossible to maintain the new positions after the 9th May. On the Horseshoe Hill ridge the British line was advanced and consolidated by further increases in depth up to 20th May and a new line was established from the south of Krastali village to Sajdelli.

The medical arrangements were practically the same as in the previous action. Personnel was held in divisional reserve with mule transport in the Vladaja ravine, and further reserves of personnel and transport were placed in readiness at other posts, and at Milovci. An unexpectedly large number of wounded was brought from the left sector of the 26th Division to the advanced dressing station of No. 80 Field Ambulance at Tortue. They were brought in rapidly and were evacuated continuously throughout the day by the mule transport.

Evacuation of serious cases from the advanced dressing station of the right sector on the Kilindir–Doiran road was impracticable by daylight, but during the night of the 8th/9th May a steady stream of vehicles, including motor ambulance cars, went up to it. The chief difficulties were enemy barrages, as before, on the ravines, especially on the one named Dorset ravine, which was the only practical route back from the Jumeaux ravine to the advanced dressing station at Tortue. Gas shells were also thrown on this advanced dressing station for a short time about 3 a.m. on the 9th May.

The wounded brought in between 2 a.m. on the 8th and 10 a.m. on 10th May numbered 34 officers and 1,121 other ranks. Hand carriage was used from the regimental aid posts

to the advanced dressing stations, although an attempt was made to use travois in evacuating one of these posts. Seven mule travois were sent up, but the method had to be abandoned as three men and five of the mules were wounded.

The whole of the reserve personnel and transport of the three field ambulances were employed in clearing to the main dressing stations, supplemented by six light and two heavy ambulance cars on the first night, by many other heavy ambulance cars on the second night, by reserves from the 22nd Division and by a number of general service wagons.

During these operations the 22nd Division took over the advanced dressing station of the 26th Division at Christmas ravine on its right, and formed another advanced dressing station at Whale Back ravine on the left, retaining also its previous dressing stations north of Kidney Hill and in Pearse ravine, with main dressing stations and divisional collecting station as before. Its front had been more extended than in the fighting in April both to the right and to the left, and this necessitated the formation of the two additional advanced dressing stations. The main routes of evacuation of the wounded, however, remained unaltered. The number of wounded in this division was fortunately small. The 60th division was also engaged on the British left, but had few casualties, and no special medical arrangements were required.

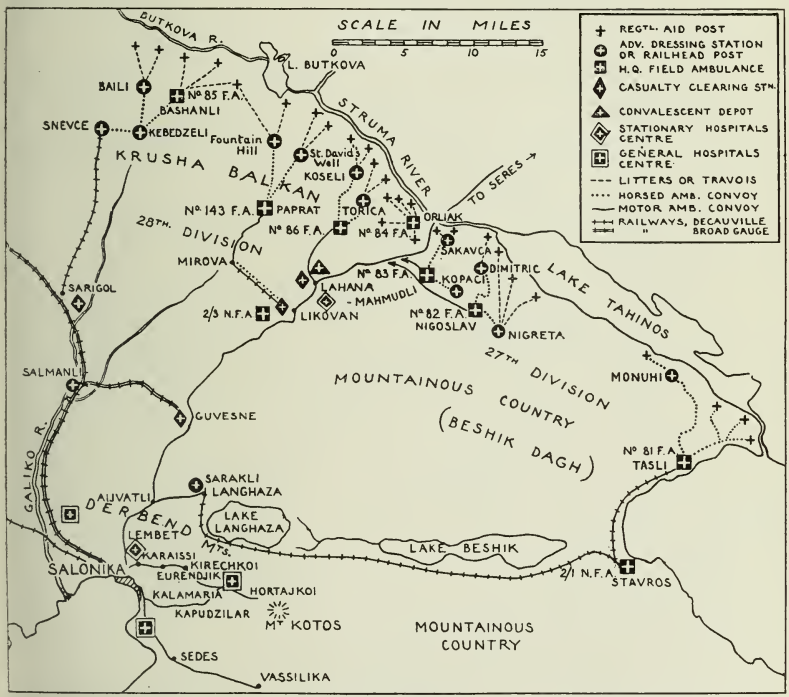
Evacuation from the main dressing stations to the casualty clearing stations and the hospitals at the base was carried out as before ; but the disposition of the cars of No. 17 M.A.C. was altered to conform with the main attack from the right of the 26th Division. The headquarters and the majority of the cars were consequently transferred from Milovci to Janes.

Evacuation to the base was rapid, 1,247 wounded and 127 sick being removed to the main dressing stations and casualty clearing stations in the first twenty-four hours. During the same period 1,019 of them were brought to the base hospitals. The numbers admitted from each division were as follows :—

Division.	Wounded.		Sick.	
	Officers.	O.R.	Officers.	O.R.
26th	34	1,121	—	33
22nd	2	70	1	72
60th	1	19	—	21
Totals ..	37	1,210	1	126

The table gives the numbers admitted and evacuated for the whole period, 8th—12th May.

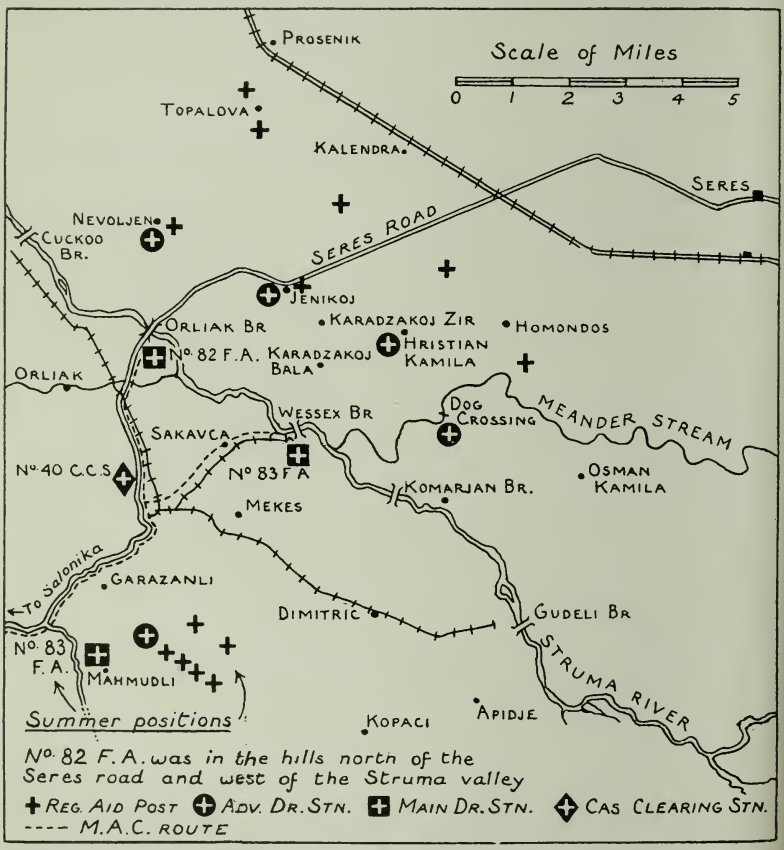
As on the previous occasion, the majority of the wounds were from shell and shrapnel, but a large number of a severe type was caused by trench mortars, and about 10 per cent. of those on the left sector of the 26th Division by gas shells. The personnel of the field ambulances suffered losses. Seven other ranks of No. 78 Field Ambulance, two other ranks of No. 79, and nineteen other ranks of No. 80 were wounded, and four of No. 80 Field Ambulance were killed.



SKETCH MAP SHOWING THE SCHEME OF EVACUATION FROM THE XVIth CORPS, SEPT. 1917. SUMMER POSITIONS

During this period the 8th Mounted Brigade was with the XIIth Corps and occupied the hill country east of Lake Doiran, linking up with the XVIth Corps front. It had arrived in Salonika from Egypt at the end of November 1916, and it left the XIIth Corps with a view to transfer to Egypt immediately after the operations in May 1917. Its mounted field ambulance had its headquarters at Irikli between four and five miles north-east of Janes, with an advanced dressing station at Patareck, three miles farther north.

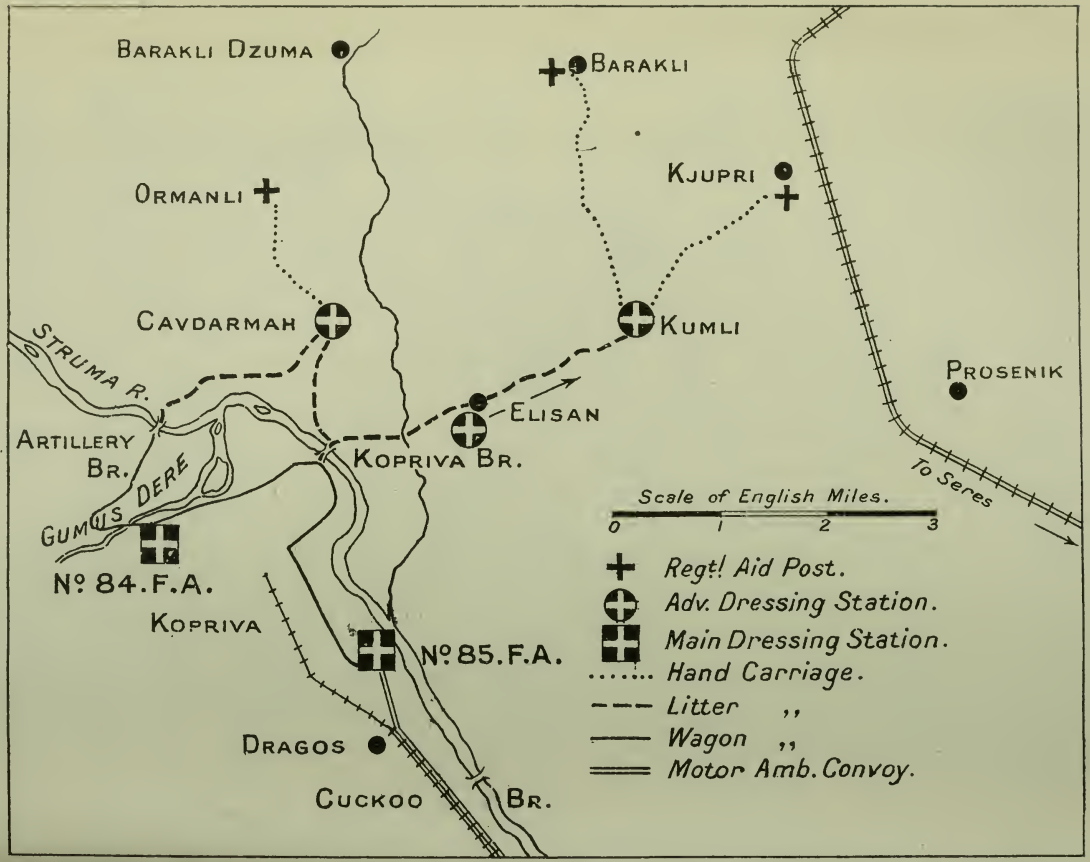
The 60th Division was also withdrawn from the XIIth Corps for transfer to Egypt after the operations, and the 22nd Division then took over the sectors occupied by the 26th Division and the 8th Mounted Brigade, while the 26th Division was moved to the left and took over the 60th Division line on the left of the 22nd Division.



DISPOSITION OF THE FIELD AMBULANCES OF THE 27TH DIVISION IN THE STRUMA VALLEY, WINTER 1917/18

On the Struma front during 1917 active operations were in abeyance until 15th May, when a further advance towards the railway line between Demirhissar and Seres was undertaken. Orders were issued, however, on the 24th May by General Sarrail for offensive operations to cease along the whole front. Consequently, as the malarial season was approaching, the forward positions in the Struma Valley were abandoned by

To face page 141.



MEDICAL SITUATION OF THE 27TH DIVISION ON THE STRUMA.

the 14th June and the troops retired to the foothills on the right bank of the river. Bridgeheads, however, were garrisoned and the vacated area patrolled. The 7th Mounted Brigade was withdrawn from the XVIth Corps in June and the 10th Division in September 1917 and transferred to Egypt. The XVIth Corps front was thus held by the 27th and 28th Divisions and the 228th Brigade during the remainder of 1917. The medical situation on this front during this period and during the winter of 1917–18 is shown on the maps. The winter was very severe, with heavy rains followed by snow and frost, and in the early days of March 1918 there was an exceptionally severe blizzard and deep snow lay on the hills. Raids and local harassing operations were continued throughout the period.

The Battle of Doiran, 1918.

In the summer of 1918 preparations were made for the final operations which took place in September. The Struma Valley front had been handed over to the Ist Greek Army Corps. The 27th Division was transferred from it to the right bank of the Vardar river, and came under the orders of the XIIth Corps. The XVIth Corps was then composed of the 228th Brigade, the 28th Division and one Greek Division, the Cretan. The positions of the divisions on the British front were then as follows: The 228th Brigade on the British right from Butkova to Bashanli in the Krusha Balkan; the 28th Division and the Cretan Division from Bashanli to east of Doiran railway station; the 22nd Division with a Greek division, the Seres Division, from Doiran railway station to Krastali; the 26th Division from Krastali to the left bank of the Vardar, and the 27th Division from the right bank of the Vardar to the Gushet Balkan, ten miles west of the Vardar, where it linked up with the French and Serbian forces. A regiment of Greek cavalry and the Greek heavy artillery were also placed at the disposal of General Milne's force. The Ist Greek Army Corps was on the British right from the mouth of the Struma to Butkova.

The medical situation was then as follows: The Stavros and Seres lines of evacuation were handed over to the Greek Corps, but the 2/3rd Northumbrian Field Ambulance, No. 27 C.C.S., a combined mounted troop field ambulance which had been improvised, a sanitary section, and two sections of No. 7 M.A.C. were left at Lahana. The third section of this convoy was transferred to the 27th Division area west of the Vardar. The 2/1st Northumbrian Field Ambulance and

the convalescent depôt remained at Stavros. These were the only British medical units on the Struma and Stavros fronts.

No. 40 Casualty Clearing Station had been moved from the foothills near Orliak, and in July 1918 was established near Gumendje station, on the right bank of the Vardar, in the 27th Division area. No. 18 Stationary Hospital, which, it will be remembered, was at Lahana as a hospital for Macedonian and Cypriot Mule Corps, had been withdrawn to Lembet. No. 25 C.C.S. had remained at Guvesne, but was practically closed, ready to move forward. As already noted, detachments of this casualty clearing station were sent in preparation for the final operations to various localities. The largest of these detachments was at Snevce.

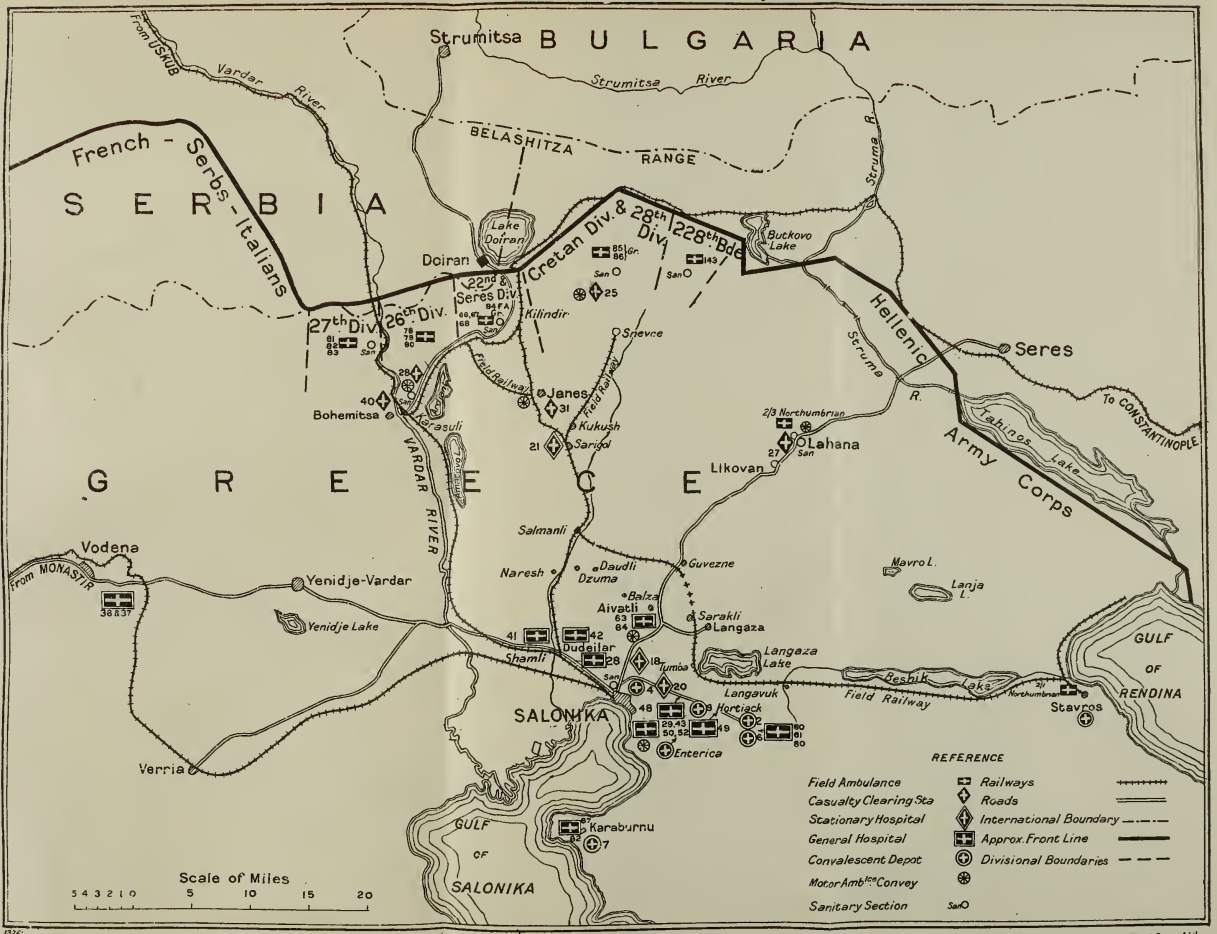
The XVIth Corps had thus on its front a detachment of No. 25 C.C.S. in the Krusha Balkan, and No. 27 C.C.S. and other British units on the Seres road. There was a gradual concentration of its divisions in front of Snevce, to which place the corps headquarters moved on 13th September. No. 27 C.C.S., at Lahana, was then ordered to prepare for an early move, the 2/3rd Northumbrian Field Ambulance taking its place at Lahana. No. 34 M.A.C., which had been with the XVIth Corps since May 1917 on the Seres road, was brought up to Snevce on the night of the 17th/18th September 1918, when troops began to move into battle positions. A line of evacuation for the XVIth Corps was consequently established through Snevce to Sarigol by the Decauville line, and thence by regular ambulance trains to the base. (See sketch map, facing p. 84.)

The medical situation behind the XIIth Corps was more or less the same as during the Doiran Battle of April and May 1917. No. 31 C.C.S. was at Janes, but No. 28 C.C.S. had been moved from Karasouli and at the time of the final operations was opened at Oreovica in the 26th Division area. No. 21 Stationary Hospital had taken the place of No. 35 C.C.S. at Sarigol. No. 17 M.A.C. headquarters were at Janes, with detachments at Gugunci and Oreovica ; and a section of No. 7 M.A.C. was at Karasouli. No. 40 C.C.S., as already stated, was opened near Gumendje station.

As the railway line of evacuation from both the XVIth and XIIth Corps fronts was consequently by the Vardar Valley or Doiran railway line to the Monastir road area at the base, the D.M.S. arranged that all serious cases should be distinguished with a red label and taken on arrival at the base to No. 28 General Hospital, near the detraining station. No. 21 Stationary Hospital, at Sarigol, was also expanded for the reception of a

To face page 142.

Medical Situation of the British SALONIKA Army 18-9-18.



1326

Malby & Sons, Litho.

large number of cases from the XVIth Corps area through Snevce. Nos. 43, 52 and 48 General Hospitals, at Kalamaria and Eurendzik, were also cleared for the reception of surgical cases; and Nos. 29 and 50 General Hospitals, at Kalamaria, for Greek sick and wounded to supplement the Greek hospitals. Greek casualties were to be evacuated through British casualty clearing stations and lines of evacuation.

The medical preparations in divisions were as follows :—

28th Division.

No. 143 Field Ambulance was at Bashanli, with an advanced dressing station in front, and with its line of evacuation to Rajanova, and thence to the Decauville line to Kukus and Sarigol. Its movements, subsequently, were determined by the G.O.C. of the 228th Brigade and it acted independently of the A.D.M.S. of the 28th Division.

Nos. 85 and 86 Field Ambulances of the division formed main dressing stations near Pangarasli and Popovo, respectively, with an advanced dressing station of the former at Rabovo, a collecting post at Popovo Neck, and a combined divisional collecting station at Balloon Hill, for the Cretan and 28th Divisions. The chief routes for evacuation were the roads running from Popovo to Snevce and from Pangarasli to Basili and thence to Snevce. These roads were suitable for wheeled transport, but not in advance of Pangarasli. In consequence of the ambulance transport of the Cretan Division being insufficient, fifteen horsed ambulance wagons, thirty travois and thirty litters with their mules, and eighteen ambulance stretcher carriers were added to the XVIth Corps. They arrived on the 16th September and were attached to No. 86 Field Ambulance.

No. 84 Field Ambulance of the 28th Division, less "C" Section, was placed at the disposal of the XIIth Corps for use with the Greek Seres Division, which was on the XIIth Corps right linking up with the 28th Division. It was established on the Vladaja–Kilindir road about one mile west of Kilindir.

22nd Division.

Nos. 68, 67 and 66 Field Ambulances were posted on the Gugunci–Doldzeli road, at Gugunci, Asagi Mahale and Pearse ravine, very much in the same positions as the field ambulance posts of the 26th Division during the battle of Doiran in the previous year.

26th Division.

Nos. 80, 78 and 79 Field Ambulances were at Kalinova, Ardzan and Smol.

27th Division.

Nos. 81, 82 and 83 Field Ambulances were at posts along the road from Karasouli across the hills through Dreveno to Kara Sinanci and Madajag.

The line of evacuation from the main dressing stations of the 22nd Division was by the Gugunci–Janes Decauville ambulance trains to No. 31 C.C.S. at Janes, from those of the 26th Division by empty supply trains or ambulance cars to No. 28 C.C.S. at Oreovica, the detraining station for which was at Spancovo, and from those of the 27th Division, by motor ambulance cars, to No. 40 C.C.S., near Gumendje station.

Regular ambulance trains ran from Janes and Gumendje railway station to the base. Ambulance trains or ambulance trucks and passenger cars attached to supply trains also ran at night from Kilindir and Kalinova.

Reserves of stretchers and blankets were kept at all casualty clearing stations. Groups of medical officers, nursing sisters and orderlies with surgical equipment were ready to proceed to casualty clearing stations from the base hospitals.

The operations on the British front were preceded on the night of the 1st/2nd September by an action fought by the 27th Division against the enemy positions in the hills south of Guevgeli, known as the Roche Noir salient. The village of Alcak Mahale was captured. Nine officers and 250 other ranks were admitted wounded to No. 40 C.C.S. on the 2nd September from this action.

After an intense bombardment of the whole of the enemy's trenches on the 14th September, at 5.30 a.m. on the 15th the main attack was made by the Franco-Serbian troops from Sokol to Vetrenik. It was entirely successful, and considerable progress was made. The British did not join in until dawn on the 18th when, according to plan, after 48 hours' bombardment, in which gas shells were used, the enemy line between Lake Doiran and " P " Ridge was attacked. The severest fighting occurred on the 22nd Division front, with the Greek Seres Division operating on its right towards Doiran village. Consequently the greatest number of wounded came back through Kilindir to No. 31 C.C.S., at Janes, and No. 21 Stationary Hospital, at Sarigol. This line of evacuation became rapidly congested and was only relieved by the ambulance trains and the improvised ambulance trains running as frequently as possible from Kilindir and Janes, and by the transfer of wounded from No. 31 C.C.S. to No. 21 Stationary Hospital, which, owing to the fewer casualties in the XVIth Corps, had

Medical Situation DOIRAN Front at time of Final Operations.

To face page 144

REFERENCE

Regt.l Aid Post	General Hd Qrs.
Adv.d Dressing Sta	Corps
Main	Division
Casualty Clearing Sta.	Frontier
Motor Amb. Convoy	Railways

Malby & Sons, Lith

a considerable number of vacant beds. Additional motor ambulance cars were also sent to the 22nd Division to relieve the congestion in its field ambulances. The XIIth Corps had No. 17 M.A.C. with the section of No. 7 M.A.C. at its disposal at the time, and the additional assistance was obtained from No. 38 M.A.C. at the base. The situation was still further complicated by the increase of sickness, caused by the epidemic of influenza.

On the XVIth Corps front the main dressing stations and the detachment of No. 25 C.C.S. at Snevce were practically clear of wounded by the 19th September, but a large number of sick were coming in. No. 27 C.C.S. had been sent up to Guvesne alongside the headquarters of No. 25 C.C.S. on that day, but remained parked ready for a forward movement. On the 20th September there was a temporary lull in the fighting on the British front. The Cretan Division and the XVIth Corps Cavalry were withdrawn to camps near Kurkut and Sarigol, and on the 21st September the Seres Division was also withdrawn from the XIIth Corps. It was replaced by the 14th Greek Division and transferred to the Ist Greek Corps on the Struma front.

On the 23rd September the advance was ordered to be pushed on with the greatest possible speed. Field ambulances at once commenced to move forward, evacuating on the left to No. 40 C.C.S. at Gumendje and on the right to No. 31 C.C.S. at Janes; and from the 28th Division to No. 25 C.C.S. Detachment at Snevce.

A re-distribution of the divisions in the two corps was made on the night of the 23rd/24th September. The XIIth Corps was then composed of the 22nd, 28th and Cretan Divisions, the 228th Brigade and a regiment of French Zouaves; and the XVIth Corps of the 26th, 27th and the 14th Greek Divisions and the Derbyshire Yeomanry. Consequent on these changes in the position and divisions of the two corps, Nos. 25, 27 and 31 C.C.Ss. and Nos. 17 and 34 M.A.Cs. were assigned to the XIIth Corps, now on the British right, and Nos. 28 and 40 C.C.Ss. and No. 7 M.A.C. to the XVIth Corps on the left.

No. 27 C.C.S., which was parked at Guvesne, was to have been brought up to Gugunci, but on the 24th September, under instructions from the Commander-in-Chief, it was sent forward to a site near Cerniste, between Doiran and Kosturino, where the XIIth Corps established its headquarters, together with the headquarters of the 28th Division, and opened there on the 28th September. No. 17 M.A.C. was also brought up to

Cerniste on the 27th September, with No. 34 M.A.C. further back on the Doiran station–Doiran village road. Evacuation from Cerniste was by the Doiran road to Doiran railway station, where No. 25 C.C.S. was opened towards the end of the month.

The XVIth Corps advanced through Bogdanci and Rabrovo to Kosturino, and eventually to Strumitza, its headquarters being at Bogdanci. An enemy hospital fairly complete in equipment was captured at Bogdanci; and a detachment of No. 28 C.C.S. was brought up to take it over on the 25th September. No. 40 C.C.S. was also moved on the 25th September from Gumendje to Guevgeli. Another enemy hospital was found by the XVIth Corps at Cinarli, on the Bogdanci–Cerniste road, and a third by the XIIth Corps on the 24th September at Prstan in the hills east of the Doiran-Kosturino road.

Medical and surgical supplies had been formed in dumps at No. 40 and No. 28 C.C.Ss. for replenishing the detachments and medical units in forward divisions. These were taken over on the 27th September by No. 22 Advanced Depôt of Medical Stores, which had remained parked at the base ready to move, and was sent forward on that date to Oreovica.

During the advance the rapidly lengthening lines of communication and the rapidity with which the troops moved forward rendered evacuation of the sick and wounded extremely difficult. Moreover the roads were bad and many bridges were destroyed by the enemy. It was all the medical services could do to cope with the large numbers of sick. Motor ambulance convoys were used to their utmost limit, and returning supply wagons were also employed for bringing back the sick. By the 27th September, however, the difficulties had been overcome, and evacuation from both the XIIth and XVIth Corps was proceeding normally.

On the 29th September arrangements were made by the D.D.M.S. XVIth Corps for moving No. 40 C.C.S. to Strumitza, and No. 28 C.C.S. to Rabrovo. The only convoy with the corps being No. 7 M.A.C., it was then decided that it should work back to Rabrovo only. No. 34 M.A.C., then at Snevce, was consequently ordered up to the Doiran road as already mentioned, to assist No. 17 M.A.C. in evacuating back from Rabrovo to Doiran railway station.

On the 30th September XVIth Corps headquarters moved to Strumitza and the 26th Division to Dragomir, five miles farther east. No. 79 Field Ambulance of the division had arrived in Strumitza on the 28th September, and No. 80 Field Ambulance on the 30th September.

Table of Casualties during the 1918 Offensive

Capture of the Roche Noir Salient by the 27th Division, 1st to 2nd September. Battle of Doiran—XIIth and XVIth Corps, 18th to 19th September. Pursuit to the Strumitza Valley, 20th to 30th September.

Date	Sept.	1		2		3		4		18		19		20		21		22		23		24		25		26		27		28		29		30	
		Ad.	Ev.	Ad.	Ev.	Ad.	Ev.	Ad.	Ev.	Ad.	Ev.	Ad.	Ev.	Ad.	Ev.	Ad.	Ev.	Ad.	Ev.	Ad.	Ev.	Ad.	Ev.	Ad.	Ev.	Ad.	Ev.	Ad.	Ev.	Ad.	Ev.	Ad.	Ev.	Ad.	Ev.
22 Div. ..	Sick									80	87	79	48	54	60	94	54	114	84	114	133	42	42	64	61	44	42	42	43	56	51	39	34	144	40
	Wnd.									87	81	1109	951	432	586	40	30	26	19	76	85	44	45	23	21	6	6	—	—	2	2	—	—	17	16
26 Div. ..	Sick									64	94	48	43	51	36	87	34	124	75	90	89	108	92	127	88	87	138	48	15	109	16	230	307	220	205
	Wnd.									7	10	96	78	540	556	14	13	7	5	16	17	—	—	3	2	63	35	14	7	—	4	—	20	8	7
27 Div. ..	Sick	72	74	39	76	83	35	71	76	150	94	140	132	171	148	256	239	357	308	348	352	218	450	208	171	308	324	280	303	321	267	279	11	267	134
	Wnd.	1	—	135	102	146	175	15	18	7	6	7	9	7	7	10	11	3	4	1	1	1	—	—	—	2	—	—	—	—	—	—	—	—	—
28 Div. ..	Sick									359	353	116	109	165	171	251	196	103	127	271	272	227	232	516	527	167	173	314	159	198	240	206	273	164	209
	Wnd.									4	2	60	61	16	15	3	3	3	—	2	1	—	—	9	9	—	—	—	—	—	—	—	—	—	—
228 Bde.	Sick									19	19	27	24	21	17	19	13	11	11	16	15	—	—	34	36	53	54	—	—	—	—	31	21	—	—
	Wnd.									—	1	—	—	—	—	—	—	—	—	—	—	—	—	1	3	—	—	—	—	—	—	—	—	—	—
12 Cp. Tps.	Sick									38	35	30	20	27	39	38	22	37	33	45	69	54	31	19	18	15	14	33	23	38	32	29	28	26	24
	Wnd.									18	14	3	5	3	3	—	—	—	—	—	—	1	1	2	2	3	3	1	1	1	1	—	—	—	—
16 Cp. Tps.	Sick									6	9	8	9	25	23	10	10	3	4	23	23	31	18	9	2	41	37	5	5	6	10	6	9	38	22
	Wnd.									—	—	13	13	2	2	—	—	—	—	—	—	—	—	—	—	22	21	—	—	—	—	—	—	5	5
1 Gk. Div.	Sick									50	37	65	21	41	37	42	26	30	23	56	25	43	35	219	37	84	86								
	Wnd.									3	—	1	—	13	11	3	—	1	11	2	—	2	—	96	1	2	—								
2 Gk. Div.	Sick									163	147	143	108	95	57	110	100	128	111	92	75	57	53	98	71	44	36								
	Wnd.									—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—								
13 Gk. Div.	Sick									35	15	41	18	46	7	53	18	39	18	48	16	44	—	38	—	49	19								
	Wnd.									—	—	—	—	1	—	—	1	—	1	—	—	4	5	—	5	—	—								
Total Brit.	Sick	72	74	39	76	83	35	71	76	716	691	448	385	514	494	755	568	749	642	907	953	680	865	977	903	715	782	722	548	728	616	820	683	859	634
	Wnd.	1	—	135	102	146	175	15	18	123	114	1288	1117	1000	1169	67	57	39	28	95	104	46	46	38	37	96	65	15	8	3	7	—	20	30	28
Total Greek	Sick									248	199	249	147	182	101	205	144	197	152	196	116	144	88	355	108	177	141								
	Wnd.									3	—	1	—	14	11	3	1	1	12	2	—	6	5	96	6	2	—								
Daily Total	Sick	12	74	39	76	83	35	71	76	964	890	697	532	696	595	960	712	946	794	1103	1069	824	953	1332	1011	892	923								
	Wnd.	1	—	135	102	146	175	15	18	126	114	1289	1117	1014	1180	70	58	40	40	97	104	52	51	134	43	98	65								

Total British sick admitted	= 9,855
Total British sick evacuated	= 9,016
Total British wounded admitted	= 3,137
Total British wounded evacuated	= 3,105
Total Greek sick admitted	= 1,953
Total Greek sick evacuated	= 1,196
Total Greek wounded admitted	= 128
Total Greek wounded evacuated	= 35

Hostilities against Bulgaria ceased on the 30th September. During the battle the total number of wounded admitted to British medical units up till then was approximately 5,688, distributed as follows, according to the report of the D.M.S. :—

	Wounded.		Gassed.		Wounded and Gassed.
	Officers.	O.R.	Officers.	O.R.	O.R.
British	131	2,928	7	324	16
French	4	150	—	1	—
Greek	70	1,796	—	17	—
Prisoners of War	9	235	—	—	—
	214	5,109	7	342	16

The number of British sick and wounded, as noted in the diaries of the medical units, admitted from each division, is shown in the table on the previous page, and, it will be seen differs considerably, especially as regards Greek wounded, from the return submitted by the Director of Medical Services. This may probably be accounted for by neglect to record names of Greek wounded in the registers of the British medical units

CHAPTER V.

THE MEDICAL SITUATION IN THE BRITISH SALONIKA FORCE AFTER THE ARMISTICE.

AFTER the Armistice with Bulgaria the formations and medical units of the British Salonika Army became widely scattered. The 26th and 27th Divisions, now forming the XVIth Corps, whose headquarters were at Strumitza, marched into Bulgaria, the former division advancing up the Struma Valley to Radomir and Sofia, and the latter eastwards towards the Turkish frontier. The 26th Division eventually proceeded to the Danube, and had its headquarters at Rustchuk until the end of 1918 when it went to Varna, on the Black Sea, remaining there until it was disbanded in May 1919. The 27th Division turned eastwards along the Maritza valley and the Constantinople railway line, but was brought back to Janes and embarked for the Caucasus in December 1918, leaving Lieut.-Colonel Ward, the officer commanding No. 81 Field Ambulance, in Sofia with the British Military Mission to supervise the repatriation of Serbian and British prisoners of war. A detachment of five officers and eighty other ranks from No. 21 Stationary Hospital was sent to Sofia at the beginning of November to work under him.

The line of evacuation was down the Struma valley to the Rupel Pass and the Salonika-Constantinople railway line. A Decauville line was under construction in October from the Pass to Demirhissar in order to facilitate transport on this line. All available cars of the XIIth Corps were sent to the XVIth Corps to assist in bringing the sick and wounded back from Bulgaria. No. 34 M.A.C. and a section of No. 7 M.A.C. were attached at that time to the XVIth Corps. The headquarters and workshops of No. 7 M.A.C. went to Rustchuk, on the Danube. The other sections accompanied the 27th Division to the Caucasus, but the whole convoy eventually was attached to that division. No. 40 C.C.S. accompanied the 26th Division. In October an advanced detachment established an evacuation post at Radomir. The headquarters of the unit closed at Strumitza in the beginning of November, and arrived at Rustchuk on the 13th December. A section was sent to Varna.

The Radomir-Rupel line of evacuation was closed on the 2nd December 1918 and evacuation from Bulgaria was then carried out by ambulance train to Dedeagatch, and thence by hospital ship to Salonika. Ambulance trains had been taken over from the Bulgarian authorities and were running to Sofia, Radomir and Dedeagatch. Each train had accommodation for fifty lying and 120 sitting, and was allotted an establishment of one officer and twenty-six other ranks of the R.A.M.C.

On the 1st January 1919 the Dedeagatch base was closed and Constantinople then became the base for evacuation from Bulgaria. Sick were sent from the 26th Division by ambulance train, but arrangements were also made to send a hospital ship, when necessary, to Varna, or to bring the sick back to Constantinople on the transports carrying supplies to Varna.

When the 26th Division was disbanded on the 11th May 1919, the medical units with it returned to Salonika and were either demobilized or joined the Army of the Black Sea.

During this time the headquarters of the XVIth Corps remained at Janes, in Macedonia, but it was disbanded on the 12th February 1919. While at Janes it had no administrative jurisdiction over the medical units in Macedonia south of Doiran, as these were placed under the D.D.M.S., L. of C. and Base at Salonika.

While the XVIth Corps divisions after the Armistice went thus into Bulgaria, the 22nd Division of the XIIth Corps was moving eastwards into Thrace and against Turkey, and occupied Drama, Kavalla and Dedeagatch. The 28th Division remained in Macedonia. The headquarters of the XIIth Corps moved from Cerniste, on the 12th October 1918, to Janes and went thence, on the 19th of the month, to Stavros, where it remained till the 29th October and then opened at Dedeagatch. After the Armistice with Turkey the Allied Army occupied Constantinople, and held the passages of the Dardanelles and the Bosphorus. The XIIth Corps headquarters went on to Constantinople. Its D.D.M.S., Colonel Nickerson, then acted as D.D.M.S. there. It was disbanded as a XIIth Corps headquarters at the beginning of March 1919, and became the headquarters of the Allied Corps in Constantinople. Large numbers of British prisoners of war began to filter into Constantinople from all parts of Asiatic Turkey. The British took over the Pera and Galata Districts, the French Stamboul, and the Italians Scutari. The railways in Asia Minor were also placed under British or French control, and British detachments were posted to points on the Anatolian railway.

SKETCH MAP OF THE AREA OF OPERATIONS OF THE BRITISH SALONIKA ARMY & ARMY OF THE BLACK SEA
RAILWAYS .....
SCALE
0 50 100 150 200 250
MILES
BLACK SEA
CASPIAN SEA
MEDITERRANEAN SEA
RED SEA
PERSIAN GULF
CAUCASUS MTS.
ODESSA
BUKAREST
R. DANUBE
BELGRADE
VIDIN
NISH
SOFIA
RUSTCHUK
VARNA
CONSTANTINOPLE
SCUTARI
ISMID
CHANAK
SMYRNA
SALONIKA
DRAMA
KAVALLA
MARITZA R.
USKUB
RADOMIR
DEDEAGATCH
DARDANELLES
CORFU
ITALY
EKATERINODAR
NOVOROSSISK
PETROVSK
BAKU
KRASNOVODSK
KHIVA
ASKABAD
MERV
MESHED
TARBAT
BIRJAND
ENZELI
RESHT
TEHERAN
ISFAHAN
TABRIZ
L. URMIA
KERMANSHAH
BAGHDAD
BASRA
BAHREIN I.
KARS
BATOUM
GEORGIA
TIFLIS
ARMENIA
AZERBAIJAN
KHUSNA
L. VAN
MOSUL
TREBIZOND
SAMSOUN
ANGORA
ALEPPO
DEIRES ZOR
DAMASCUS
CAIRO
20°
30°
40°
50°
60°

The 22nd Division had been withdrawn to Stavros on the 21st November, and replaced the 27th Division in the Janes area, when the latter embarked for the Caucasus. The 22nd Division was disbanded in March 1919. Until then its A.D.M.S. controlled the medical arrangements on the line of evacuation from Dedeagatch to Salonika.

The 28th Division remained in the area between Doiran and Kosturino and the Belashitza range until the 19th October, when it was concentrated in the Janes area under General Headquarters, until November 1918, when it embarked for the Dardanelles. Its headquarters went to Chanak.

When Dedeagatch became the base for evacuation from Bulgaria, No. 31 C.C.S., which had been at Janes, was brought there by sea from Salonika and arrived on 27th October. It sent detachments to Drama, Oxilar, Xanthi, and Gumuldjina, on the railway line between Dedeagatch and Seres, and evacuated from Dedeagatch to Salonika both by sea and rail. An improvised Bulgarian ambulance train carrying 100 patients was used on the railway, under the XIIth Corps administration. Hospital ships evacuating by sea called on their way back at Kavalla and Stavros. Attached to No. 31 C.C.S. at Dedeagatch were No. 9 Advanced Depôt of Medical Stores and a mobile X-ray unit.

The sick and repatriated prisoners of war from Bulgaria were received into No. 31 C.C.S. before being sent on to Salonika, and repatriated Bulgarian prisoners were sent back from Salonika through Dedeagatch to Sofia. When Dedeagatch was closed as a base, No. 31 C.C.S. was brought back to Seres, and remained there until ordered to Salonika in February 1919, leaving detachments as aid posts at various stations along the line from Constantinople. It went to Guvesne in March and was disbanded in April 1919.

Of the four general hospitals with the Serbian Army, three, Nos. 36, 37 and 38 were demobilized by April 1919, the first two from Vertekop, and No. 38 from the Kalamaria district of Salonika. At the end of January 1919, the fourth general hospital, No. 41, received orders to proceed to North Serbia in three detachments, each of 200 beds with 3 medical officers and 25 other ranks. These detachments were opened at Negotin, Zajecar, and Kuazerac, in the Timok Valley, in Serbia. No. 33 Stationary Hospital was sent at the same time to Belgrade as a 300-bed hospital. On the 3rd May 1919 instructions were issued by the War Office for the demobilization of these British hospitals in Serbia. Consequently, No. 3

Stationary Hospital was disbanded on the 13th May 1919, having handed over its hospital to the Scottish Women's Hospital, which had been working with the French and the Serbians in Macedonia since 1915. No. 41 General Hospital also closed at the end of May. Its personnel went to Constantinople and was distributed amongst other British hospitals there. While in North Serbia the work of No. 41 General and No. 33 Stationary Hospitals was mainly amongst the sick of the civil population.

After the demobilization of the XVIth Corps and the 22nd and 26th Divisions, the two remaining divisions of the British Salonika Force formed the Army of the Black Sea, under General Sir G. Milne. General Headquarters of the Force moved from Salonika to Constantinople on the 14th December 1918, but the headquarters of the administrative services and the D.M.S. remained in Salonika till April 1919. At Constantinople Lieut.-General Sir H. F. M. Wilson had been placed in command of the allied troops in Turkey-in-Europe and the passages of the Dardanelles were held under his command by the 28th Division. Medical units were then withdrawn from Macedonia to the new base at Constantinople.

When the XIIth Corps headquarters arrived in Constantinople on the 27th November an improvised British hospital of 100 beds was opened for repatriated British prisoners of war in Turkey. No. 85 Field Ambulance was then in Constantinople and No. 84 in Chanak. Indian battalions were replacing British battalions in the Army of the Black Sea and a section of No. 110 Indian Field Ambulance was consequently attached to the 28th Division. No. 28 C.C.S., which had moved to Rabrovo at the time of the Armistice, was brought back to Salonika on the 19th November 1918, and embarked for Constantinople five days later. On the 30th November it was opened at Chanak, and converted into a combined unit for British and Indian sick, 1 officer of the I.M.S. and 51 Indian other ranks being attached to it. It was disbanded in June 1919, and was replaced in Chanak by No. 49 Stationary Hospital, from Salonika. No. 82 General Hospital was reorganized as a general hospital of 1,560 beds, half for British and half for Indian sick, and embarked for Constantinople from Salonika about the end of November. When the 26th Division, in Bulgaria, commenced to evacuate its sick to Constantinople a second general hospital, No. 52, was sent to Constantinople in March 1919 and, in consequence of the number of Indian battalions with the divisions, No. 48 Indian General Hospital

was also transferred from Salonika to Constantinople at the end of April 1919. It had arrived in Salonika just after the Armistice with Bulgaria, and, until its transfer to Constantinople, Indian sick were evacuated to it from the Dardanelles. No. 20 Stationary Hospital went to Constantinople in March 1919 as a venereal hospital of 600 beds.

No. 5 Convalescent Depôt was transferred from Salonika to Constantinople at the beginning of 1919. An Indian Convalescent Depôt which had been opened in Salonika was removed to Constantinople on the 13th April 1919 and placed near No. 48 Indian General Hospital.

The motor ambulance convoys transferred to the Army of the Black Sea from the Salonika Base were Nos. 7, 32 and 34. No. 17 and No. 38 M.A.Cs. had been disbanded in March 1919, leaving No. 9 M.A.C. as the only convoy for work in Salonika. No. 7 M.A.C. was with the 27th Division in the Caucasus, No. 34 with the 28th Division, and No. 32 at Constantinople, to which base it was transferred from Salonika in April 1919. These three convoys remained with the Army of the Black Sea until September 1919, when No. 32 was disbanded. No. 7 was disbanded a month later, and No. 34 was then the only convoy left for the whole force. It was reorganized on a basis of 70 motor ambulance cars of uniform make obtained from cars of all three convoys.

Of the depôts of medical stores, No. 9 Advanced Depôt went from Dedeagatch to Constantinople. It opened with the Central Laboratory in the Turkish Barracks, and was the only medical stores unit there until April 1919, when No. 12 Base Depôt arrived from Salonika. In July 1919 No. 9 Advanced Depôt was absorbed into No. 12 Base Depôt and disbanded. No. 7 Base Depôt had been demobilized in Salonika at the end of 1918, leaving No. 9 Base Depôt at that base.

No. 25 Mobile Hygiene Laboratory and No. 26 Mobile Bacteriological Laboratory were attached to No. 82 General Hospital in December 1918, and went to Constantinople.

The medical units withdrawn from Salonika for the 27th Division in the Caucasus were No. 21 and No. 18 Stationary Hospitals, No. 25 and No. 27 C.C.Ss., sections of No. 7 M.A.C., No. 22 Advanced Depôt of Medical Stores, and No. 28 Mobile Bacteriological Laboratory. In addition to its own three field ambulances, Nos. 81, 82 and 83, a section of No. 110 Indian Field Ambulance was attached to the 27th Division. The 27th Division occupied posts in Armenia and Georgia, and joined up on the Caspian Sea with a brigade under

Major-General Sir W. M. Thomson from Mesopotamia, and a military mission from India, under Major-General Sir W. Malleson, accompanied by a detachment of British and Indian troops under Brigadier-General G. A. H. Beatty, in the vicinity of Merv.

General Thomson had with him as his medical unit No. 40 Combined Field Ambulance from the Mesopotamian Expeditionary Force and some Ford ambulance cars. General Malleson had No. 48 and No. 178 Combined Cavalry Field Ambulances, and a detachment of a British general hospital from India. His line of communication was from Quetta to Meshed, and thence to Askabad, the headquarters of the Force. No. 58 British General Hospital was opened with an X-ray unit at Meshed, No. 17 C.C.S. at Tarbat, and there were a medical store depôt and sanitary section at Birjand. All these units were from India. The only ambulance transport with Malleson's Force were stretchers and riding ponies, and motor ambulance cars were consequently sent from the 27th Division to it. Anenkovo was the front position of this force, and when it came under the Army of the Black Sea, arrangements were made to evacuate its sick to the 27th Division units. A Russian ambulance train, under the charge of an officer, I.M.S., with a section of No. 48 Combined Cavalry Field Ambulance, ran from Anenkovo to Krasnovodsk, on the eastern shore of the Caspian, and thence by ship to Baku, on the western shore. Passenger ships or cargo ships were used for the crossing staffed by medical personnel from Baku, where No. 25 C.C.S. was opened. No. 40 Combined Field Ambulance formed medical posts at Petrovsk, Krasnovodsk, Shusha and other places.

Samsoon and Trebizond on the Asiatic coast of the Black Sea were also garrisoned for some time but came under the administration of the 28th Division, or of G.H.Q. Medical posts manned by a section of No. 143 Field Ambulance were formed there. The 27th Division, however, had to arrange for the hospital ships, evacuating sick from Batoum, to call at these ports on their way back to Constantinople.

The headquarters of the 27th Division was at Tiflis, with No. 18 Stationary Hospital and Nos. 81 and 83 Field Ambulances. A section of No. 110 Indian Field Ambulance was at Kars ; No. 21 Stationary Hospital, No. 27 C.C.S. and No. 22 Advanced Depôt of Medical Stores were at Batoum.

Only one and a half sanitary sections were allotted to the 27th Division. They were distributed in sanitary areas, as in France, with headquarters at Batoum, Baku and Tiflis.

The sanitary work in the Caucasus and Trans-Caucasia was helped to a great extent by bathing and disinfecting establishments taken over from the Russian Army by British sanitary personnel. There were bathing and disinfecting trains capable of dealing with 600 to 800 men daily, but they were suddenly removed by the Georgian authorities to an unknown destination, and the sanitary personnel on them had to make a hurried escape.*

Venereal diseases were the chief cause of inefficiency amongst the troops of the 27th Division. Malarial infections occurred in Batoum, Petrovsk and elsewhere, but Baku and Tiflis were comparatively free. Typhus fever, smallpox, dysentery and cholera were more or less prevalent amongst the civil population, but the troops were never seriously affected. Infectious jaundice was prevalent amongst the Indians of Malleson's Force, and there were also a few cases of frost bite, but venereal disease was the most prevalent complaint amongst the British of this force also.

One of the field ambulances at Tiflis became a venereal disease hospital and the other a hospital for infectious diseases. No. 18 Stationary Hospital received the ordinary sick. At Baku No. 40 Combined Field Ambulance was set apart for infectious diseases. The Russian huts and hutted hospitals found at Batoum were well up to the standard of the British medical services, and were occupied by the British medical units. No. 21 Stationary Hospital at Batoum occupied the Russian Barracks, which had been converted into a hospital early in the war. It consisted of a number of pavilions, and all classes of surgical and medical cases, including infectious cases, could consequently be accommodated in it. No. 27 C.C.S. was in a hutted Russian hospital and received medical and surgical cases. The field ambulance was also in huts and became a venereal hospital. An Indian section, with an Indian establishment, was formed in all these units.

No. 28 Mobile Laboratory was established at No. 25 C.C.S., Baku, and No. 27 Mobile Laboratory at No. 21 Stationary Hospital, Batoum. Dental centres were opened at Baku, Tiflis and Batoum.

Most of the posts garrisoned by the troops in the Caucasus and in Trans-Caucasia were connected by railway or by sea with Baku and Batoum, and an excellent Russian ambulance

* Medical History of Trans-Caucasia in so far as it Affects an Army in the Field. By Lieut.-Colonel P. H. Henderson, D.S.O., R.A.M.C.—Journal of the R.A.M.C., p. 101, February 1921.

train with a British and Indian personnel was employed on the Baku-Tiflis-Batoum line. From outlying posts ambulance coaches were attached to passenger trains.

Evacuation of the sick from the isolated posts, such as Shusha in the Armenian Highlands, was difficult and arduous. The patients had to be brought to the railway line in sleighs, travois, litters, ambulance wagons, cars, or on riding mules. "From one outpost the only suitable transport was a sleigh, and the journey occupied about five days."*

British troops were withdrawn from Trans-Caucasia and the Caucasus in September 1919, and the 27th Division and its medical units were then disbanded, but a garrison was left at Batoum, with No. 27 C.C.S. and a sanitary section under a senior medical officer. Two sections of No. 82 Field Ambulance were also organized as a bearer column and attached to No. 27 C.C.S., while the remainder of the unit was demobilized. This garrison was eventually withdrawn in July 1920.

While the 27th Division was occupying the Caucasus, a British Military Mission was with General Denikin's Army in South Russia, based on Novorossisk, on the Black Sea. Colonel Birrell, who had been D.D.M.S. of the XVIth Corps, was appointed D.D.M.S. with the Mission after the XVIth Corps was disbanded. A large amount of medical stores, motor ambulance cars and horsed ambulance wagons were sent from the British Salonika Army to Novorossisk for the Russians, and also from the United Kingdom, altogether amounting to stores and equipment for twenty-eight field ambulances, five casualty clearing stations, twelve general hospitals of 520 beds each and seventeen stationary hospitals, two ambulance trains, 174 motor ambulance cars and 174 ambulance wagons. Colonel Birrell joined the British Mission on 6th March 1919 and remained with it till the 11th October. He was succeeded by Lieut.-Colonel H. S. Roch until the appointment terminated when the Mission was withdrawn in June 1920. Russian refugees were evacuated from Novorossisk to Constantinople, when a large camp was prepared for them on the island of Prinkipo in the Sea of Marmora.

The main duties of the Mission were the issue of material and giving instruction in its use where necessary. From March until the end of August Mission Headquarters was at Ekaterinodar, with a base at Novorossisk, on the Black Sea. At the

* Journal of the R.A.M.C., February 1921. *op. cit.*

end of August Mission Headquarters moved to Taganrog following General Denikin's Headquarters, where a small hospital for the sick of the Mission was opened.

The medical service of the Mission included, in addition to Colonel Birrell as D.D.M.S., a D.A.D.M.S. (San.), an instructor in field ambulance duties, and a medical officer to the Mission. In October, 3 officers and 60 other ranks R.A.M.C. arrived and were distributed to the British hospital at Taganrog, and to a detachment hospital and Base Medical Stores at Novorossisk. In January 1920, the Taganrog hospital was withdrawn to Novorossisk and expanded to 140 beds. The field ambulance instructor was stationed at Novorossisk to supervise the unloading and handing over of medical equipment to the Russian medical service, his duties in this respect being considered of more importance than those of instruction in its use.

The field medical equipment, on the scale of one cavalry division, six divisions and a line of communication in proportion, as for the British Expeditionary Force in 1914, arrived from the United Kingdom, Army of the Black Sea, and Italy. As the Russian medical service was very short of material and had to retain all patients until termination of the case, the L. of C. units and medical stores depôts proportionate to one cavalry division and six divisions were not enough, and a very large supply of general medical and surgical material was obtained from the Army of the Black Sea in August 1919. During the course of the summer a further quantity of field medical equipment was sanctioned, but this was confined to regimental and field ambulance equipment only. Demands were also made for a large supply of laboratory material and for medical comforts. Gifts of clothing and other articles were sent out by the British Red Cross Society.

There was considerable delay throughout the whole period in getting material to the front. The procedure was that the Russian medical service received the equipment at the base and sent it forward. In August, by order of the G.O.C., the Mission undertook distribution of all material, and the equipment of several medical units was taken personally to divisional and army headquarters and handed over by Colonel Birrell. Several visits were made by him to the Russian field formations to ascertain their requirements and to see how the distribution of British material was progressing.

The chief source of wastage in the Russian Army was from sickness, especially typhus fever.

In May 1919, General Wrangel, who then commanded the Don Army, asked the G.O.C. of the British Mission to send Colonel Birrell back to him to consult on preventive measures against typhus fever. Recommendations were made that as bathing trains and other elaborate apparatus to which the Russians were accustomed were not available, waterproof sheets placed in holes in the ground should be used for bathing, a certain number to each unit, hot water being supplied from field cookers or other means. For disinfecting purposes Serbian barrels were recommended. In view of what was observed at the front and in hospitals, the need for separation of typhus cases and suspects from others during evacuation, and for the prevention of beds touching each other in hospitals was emphasized, and the routine disinfection of the clothing of sisters and attendants in typhus hospitals was advised. A draft order in Russian, which was published by General Wrangel, was prepared, describing waterproof sheet baths and barrel disinfectors.

The wastage from typhus fever was a serious matter for the strength of the Army, and the casualties from this disease, many of them fatal, amongst doctors, voluntary aid nurses and male attendants were very high. The voluntary aid nurses showed the greatest courage in always coming forward to replace losses amongst their numbers.

The men sent to the British Mission from the United Kingdom were of poor physical category, and had not undergone proper medical examination before embarking. There was much sickness amongst them, chiefly venereal disease, but there were about 50 cases of typhus fever with 8 deaths in November-December 1919, and January 1920. There were also some cases of smallpox, cholera and enteric fever.

The medical units of the 28th Division were chiefly employed in forming medical posts on the Anatolian railway and in Asia Minor. The divisional headquarters moved from Chanak to Moda on the 13th April 1919. No. 52 Ambulance Train was employed on the Anatolian railways for collecting sick from the various garrisons in Asia Minor. In September 1919 the field ambulances of the Division, which were 1st line Territorial Force units, were returned as cadres to England, but the field ambulances themselves continued with the Division as Nos. 84, 85 and 86. Those of the 27th Division being also Territorial Force units, were similarly dealt with but were disbanded immediately afterwards.

Chanak had been occupied as a base for the troops in Asia Minor until October 1919, when it became a small garrison with an Indian battalion. The only medical unit then left in Chanak was a section of No. 110 Indian Field Ambulance. No. 49 Stationary Hospital was then disbanded.

During this time the Turkish national movement in Anatolia commenced, and in March 1920 became increasingly hostile. Consequently, it was decided to withdraw the British detachments from their posts on the Anatolian railway to Ismid. A military occupation of Constantinople by Allied troops was effected on the 16th March 1920, and by the 27th March the final withdrawal of the Anatolian railway detachments to Ismid was carried out. An infantry brigade, the 242nd, was then formed at Ismid, and entrenched there. It was attacked on the night of the 14th/15th June 1920 by Turkish nationalist troops, and a company of an Indian battalion guarding a road junction some four miles north of Ismid, while retiring on the town, suffered severe losses. The attacks continued during the next few days, but were repulsed. Subsequently small mobile columns of mounted infantry and cavalry were formed to maintain order in the Ismid Peninsula.

Apart from the work of receiving and treating the sick of the Constantinople garrison and of the British and Indian troops in Asia Minor, the Caucasus and Trans-Caucasia, the medical services and units of the Constantinople base had much work thrown on them in connexion with the civil population, refugees and repatriated prisoners of war. But their most responsible work was concerned with the prevention of disease. There was a considerable amount of typhus fever amongst the civil populations in Constantinople, Angora, Ekaterinodar and Novorossisk. Cholera appeared in Constantinople and on the shores of the Black Sea in July 1919, and cases of plague in troops arriving on a transport from Batoum in August.

An Inter-Allied Sanitary Committee with the D.D.M.S. of the XIIth Corps as president, was formed in January 1919, for sanitary supervision of Constantinople City. On the 3rd March the International Hygiene Committee, which had been formed in Salonika by Surg.-General W. G. Macpherson in December 1915, was re-formed in Constantinople with the same constitution and with the same objects. The allied troops of the Salonika Force were then covering an immense area from the Adriatic to the Caucasus, and it was arranged to form local sanitary committees for the ports and chief towns of the occupied area. The Inter-Allied Sanitary Committee for

Constantinople City then became the local committee for that port and town. The International Hygiene Committee thus acted as a legislative, and the town and port committees as an executive, sanitary authority. Amongst other duties they established and carried out quarantine regulations in the Dardanelles and Bosphorus. Sanitary sections and specialist sanitary officers were appointed to areas occupied by the British. Their duties included investigations into the presence of infectious disease and epidemics among the civil inhabitants, disinfecting soldiers and others before embarking on ships, disinfecting trains, ships and their passengers and segregating contacts.

In October 1919 the administrative medical services of the Allied Corps Headquarters in Constantinople were abolished, and the appointments of D.D.M.S. and D.A.D.M.S. then ceased to exist. The D.A.D.M.S. for Sanitation, however, was retained. The administrative duties previously carried out by the D.D.M.S. were taken over direct by the D.M.S., G.H.Q. of the Army of the Black Sea. The British troops of the Army consisted at that time of the 28th Division and army troops only. They were concentrated on the Bosphorus and Dardanelles and in or around Constantinople, with posts at Batoum, a base for the British South Russian Military Mission at Novorossisk, a small base at Dedeagatch for repatriating prisoners of war from Salonika and a steadily diminishing base at Salonika itself.

As already noted, General Headquarters had been transferred to Constantinople on the 14th December, 1918, but the D.M.S. and other administrative services remained in Salonika till the 1st April 1919, when the designation of the British Salonika Force was changed to that of the Army of the Black Sea. Steps were taken for closing the Salonika base by demobilizing the units left there or transferring them to Constantinople or Egypt.

When the four casualty clearing stations from Macedonia were gradually withdrawn for work either in Bulgaria or with the Army of the Black Sea, the 2/1st and 2/3rd Northumbrian Field Ambulances were organized as casualty clearing stations of 300 beds each, the former at Stavros and the latter at Guvesne. They were disbanded in March 1919.

Nos. 49, 61, 64 and 67 General Hospitals were closed and disbanded by the beginning of 1919. No. 80 General Hospital had been converted into a mixed hospital for British and Indian patients in December 1918, but commenced demobilization

almost immediately afterwards. It was finally disbanded in February 1919. In March 1919 Nos. 29, 42, 48, 50 and 63 General Hospitals were disbanded, and Nos. 48 Indian and 52 General Hospitals were transferred to Constantinople ; so that when the headquarters of the administrative medical services left Salonika, only Nos. 28, 60 and 43 General Hospitals remained there. No. 60, which had sent a detachment of 150 beds to Veles, in Serbia, immediately after the armistice, was demobilized in May, and No. 28 in June 1919. No. 43 General Hospital was thus the only hospital eventually retained in Salonika. It was used chiefly for the reception of the sick from the Salonika garrison, the Macedonian Labour Corps and Bulgarian and Turkish prisoners of war previous to their repatriation. All the stationary hospitals, Nos. 18, 20, 21 and 49, had already been transferred to the Army of the Black Sea. The convalescent depôts had also been closed or transferred to Constantinople by the end of 1918 and beginning of 1919, except No. 4, which remained open in Salonika till May 1919.

No. 9 Base Depôt of Medical Stores was transferred to Novorossisk from Salonika in July 1919. As already noted two advanced depôts had been sent to the 27th and 28th Divisions, and No. 12 Base Depôt to Constantinople. No. 7 Base Depôt had been disbanded.

The appointment of a D.M.S. as head of the administrative medical services ceased in November 1920, when Major-General Sir M. Holt was transferred to England. Colonel C. B. Martin was then appointed from his staff as Deputy Director of Medical Services of the Army of the Black Sea, and eventually of the British Medical Services during the Allied occupation of Constantinople and the areas of the Bosphorus and Dardanelles.

The chief source of sickness during the period of demobilization was influenza. Some cases of scurvy occurred amongst the Indian troops early in 1919, and a considerable amount of sandfly fever occurred at Chanak in the summer of that year. Otherwise, the troops remained free from any outbreak of typhus, cholera or smallpox, although these were prevalent in many of the areas occupied by them, and with the exception of venereal diseases their health was good.

CHAPTER VI.

THE OPERATIONS IN LOWER MESOPOTAMIA.

AFTER war had been declared in Europe an Expeditionary Force, consisting of the 6th (Poona) Division from India under Lieut.-General Sir Arthur Barrett, was sent by the Indian Government to protect British interests in the Persian Gulf. Advanced troops, composed of the 16th Infantry Brigade, had sailed from India on the 16th and 18th October 1914. They were to assemble at Bahrein, on the Persian Gulf, and were accompanied by three sections of No. 125 Indian Field Ambulance to which one section of No. 17 British Field Ambulance was temporarily attached.

Hostilities with Turkey commenced at the end of October, and on the morning of the 6th November 1914 the transports with the 16th Infantry Brigade, escorted by H.M.S. "Odin," crossed the bar of the Shatt-al-Arab in Lower Mesopotamia, and engaged the Turkish fortifications at the entrance to the river. After the enemy batteries had been silenced, a small force landed without opposition and occupied Fao at the debouchment of the river on the night of 6th/7th November.

The Shatt-al-Arab is tidal for a distance of 70 miles, as far as Qurna, where the river is a quarter of a mile wide at the confluence of the Tigris and Euphrates. The current is about four knots an hour under normal conditions, and the river banks are fringed with a belt of date palms and thick vegetation varying from one-half to two miles in width. Beyond this belt is the open country, a vast plain intersected by swamps and old roads. The soil, when wet, becomes tenacious mud and renders the use of wheeled vehicles impossible, though in dry weather such vehicles can be used. The country is indented by numerous creeks running at right angles to the river, and these require bridging for the transport of troops moving along the banks of the river. The climate is hot and damp during the summer months, the temperature often reaching 125° F. in the shade. In the winter months, especially during November and December, the climate is very treacherous, and cold spells with heavy downpours of rain often occur; occasionally there are several degrees of frost. The difference, even in winter, between the highest and the lowest thermometer readings may reach 40° to 60° F. Such was the terrain and country in which the early operations took place.

The Operations leading to the Occupation of Basra.

On the 7th November, while the force which had landed to occupy Fao was being re-embarked, the general officer commanding and the remaining troops proceeded up-river to Saniya, situated on the right bank opposite the oil refinery above Abadan, some 40 miles from the sea. Here a suitable landing place was reconnoitred, and the troops were disembarked by the evening of the 10th. As little baggage and supplies as possible were landed at this camp. On the same evening reliable information was received that a strong combined force of Turks and Arabs had arrived from Basra and had encamped a few miles upstream of the British force, preparing to attack. At 3 a.m. on the next morning this hostile force moved forward, and a detachment about 300 strong delivered an attack at 5.30 a.m. on one of the British defence posts held by a double company of the 117th Mahrattas with two machine guns. The enemy advanced to within 50 yards of the post, but was driven off. He then retired to Saihan, four miles upstream, leaving 19 dead, 12 wounded and 6 prisoners. The British casualties were few and were evacuated by stretcher bearers from the regimental aid posts to the advanced dressing station opened on the bank of the river by "C" Section of No. 125 Indian Field Ambulance. From the advanced dressing station, the casualties were transferred by barge to the transport "Varela" lying in mid-stream. This transport had been converted temporarily into a hospital, and was staffed and equipped by the personnel of "A" and "B" Sections of No. 125 Indian Field Ambulance.

Three days later Lieut.-General Sir Arthur Barrett arrived, accompanied by the 18th Brigade and divisional troops. A small force attacked the Turkish force in their entrenched position at Saihan on 15th November. The attack was made through date groves and over open desert, and the enemy's first position was captured at 8.30 a.m. A general advance was then made across the open desert on the second Turkish position, which was rushed and taken at 9.30 a.m. Inside the palm groves there were numerous irrigation cuts, which considerably impeded the advance. After the attack the force was withdrawn and returned unmolested to the camp. The British casualties were 2 British officers wounded, 6 other ranks killed and 35 wounded, 3 Indian other ranks killed and 16 wounded. The casualties were caused by shrapnel and shells from pompoms—used by the Turks as a trench gun—and by rifle bullet,

To face page 164.

1326. Malby & Sons, Lith.

and they were scattered over a very wide front. During the action the wounded were dressed and collected into groups as far as possible to facilitate subsequent removal. As the ground over which the advance had been made was flat, quite open and devoid of cover, it was impossible to remove them during the action, but they were afterwards conveyed back to the advanced dressing station opened by " B " Section of No. 17 British Field Ambulance some two miles farther back. The ground was very heavy and, owing to the deep mud, as many as four sepoys from the supporting troops had to assist each stretcher party. From the advanced dressing station the wounded were again transferred on stretchers to No. 125 Indian Field Ambulance at Saniya, and from there the British casualties were sent to an improvised hospital on the s.s. " Varela," and the Indian casualties to the s.s. " Erinpura."

At this time there were on the " Varela " sections of a British general hospital, and on the " Erinpura " No. 9 Indian General Hospital. They were ordered by the A.D.M.S. of the 6th Divison, Colonel P. Hehir, I.M.S., to open on board for the reception of wounded.

On the 16th November it was reported that a hostile force would probably be met about Sahil and Saihan, which are opposite Mohammera, on the right bank of the Shatt-al-Arab. General Barrett's intention was to attack the enemy, turn his right flank and drive him through the date groves on to the river so that the two naval sloops, the "Odin" and "Espiegle," which had moved up the river on a level with the British force, might be able to co-operate. The British force moved across the open desert, the surface of which, owing to recent rains, was very muddy in places, though fortunately free from creeks and other obstructions. The Turks were found entrenched in a strong position at Sahil. After the action had commenced, General Barrett found it advisable to alter his original intention, and the 16th Infantry Brigade was ordered to turn the enemy's left flank, while the 18th Brigade engaged the enemy on his right and centre with a frontal attack. While these battle dispositions were being made there was a heavy downpour of rain lasting for half an hour. The front was entirely obscured, while the surface of the ground was converted into a quagmire ankle deep.

The medical units with the 16th Brigade were " B " Section of No. 17 British Field Ambulance and the bearer sub-divisions of " A ," " B " and " C " Sections of No. 125 Indian Field Ambulance. With the 18th Brigade was No. 126 Indian Field Ambulance. " D " Section of No. 125 Indian Field

Ambulance was in reserve. The orders issued by the general officer commanding for the disposal of sick and wounded were to the effect that they " were to be carried with the force by those medical units."

The turning movement and assault over 700 yards of exposed plain were successful, and the enemy, abandoning his line of entrenchments, fled rapidly into broken muddy ground which afforded facilities for defence but none for pursuit. The British and Indian wounded were scattered over a considerable area of ground. They had to be collected and an entrenched camp formed before night-fall. The British losses were due mostly to rifle and machine gun fire; one battalion lost 200 in the final advance. The casualties from shell fire were not heavy, as the enemy shrapnel burst too high. The country over which this action was fought was devoid of cover, and nearly all the wounded lay within 600 yards of the enemy's trenches. It was consequently impossible to attempt removal of the wounded during the action except in a few instances, but the regimental medical officers and stretcher bearers continued to render first aid in the exposed positions. The field ambulances could not maintain communication with the advancing infantry, though one officer in charge of a bearer division managed to crawl up with his assistants to the support line of one battalion and bring dressings and first aid requisites. After the action great difficulty was experienced in removing some of the wounded who numbered approximately 500. Each brigade detailed search parties to assist in bringing them from the area over which it had fought. There was no transport for wounded except riding mules, and these were unsuitable for any but very minor cases. By night-fall practically all the wounded had been brought in on stretchers to a bivouac in a date palm grove, half a mile from the river. Here they were made as comfortable as possible; they were placed on blankets and were fed and dressed. No more rain fell, which was fortunate as there was no tentage available. One small party of wounded, however, had to be left out all night. A medical officer and " C " section of No. 126 Indian Field Ambulance had been left in charge of them protected by the British outpost line. It was intended to embark the wounded at once on board the " Varela " and " Erinpura," but a heavy sand storm and rough gale arose and rendered this impossible. The river at this point had shelving mud banks and was running with a strong current of eight knots, thus further delaying the embarkation of the wounded until next morning. Some of the casualties

were suffering from severe wounds caused by heavy lead bullets from the Martini Henry rifles with which the Arab-Turkish troops were armed. The exit wounds, in cases where a bone such as the femur had been injured, were very large owing to the explosive effect and in many of these cases death from shock supervened. The "Varela" and "Erinpura" were staffed at the time by one section of No. 3 British General Hospital and two sections of No. 57 Indian General Hospital on the former and No. 19 Combined Clearing Hospital and part of two sections of No. 9 Indian General Hospital on the latter.

Ashar Creek, Basra.

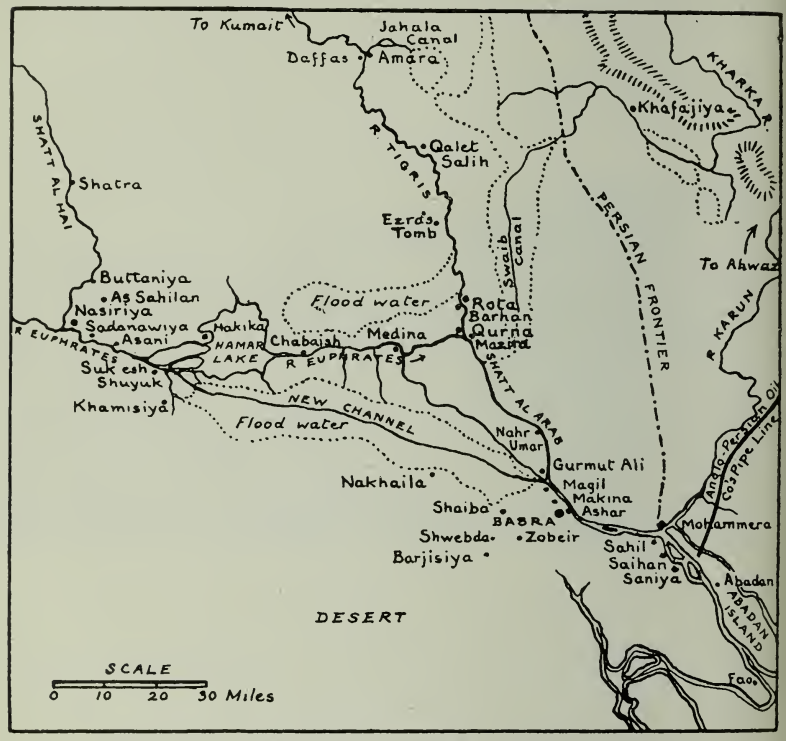
After this battle the Turkish force retreated to Qurna and there were no further operations prior to the British entry into Basra at 9 a.m. on 22nd November 1914.

The Operations leading to the Occupation of Qurna.

The action at Sahil had thus early demonstrated what the medical services would have to contend with in Mesopotamia. The lessons that stand out clearly were the difficulty in clearing wounded in a flat country until the action had terminated or was in abeyance, the lack of organized units to clear the field ambulances, the lack of land and river transport and the lack of knowledge in connection with medical problems on the part of the headquarters staff. The order of the general officer commanding that "sick and wounded will be carried with the

force by those medical units " was contrary to all principles of training. It was responsible for many subsequent hardships and failures.

Qurna, where the Turkish troops took up their next position, was a village which projected into the junction of the old Euphrates and the Tigris. In this neighbourhood both rivers are about 130 yards across ; the district is low lying and has an extensive swamp to the north and north-west.



SKETCH MAP OF LOWER MESOPOTAMIA

On the 25th November the " Odin " and " Espiegle," with the armed launches " Mina " and " Maschona," made a reconnaissance upstream as far as Qurna and they confirmed the report that the Turks had reassembled there. A mixed force was sent up-river under the command of Lieut.-Colonel G. S. Frazer. The medical units with it were the bearer sub-divisions of " D " section of No. 16 British Field Ambulance, " B " section of No. 126 Indian Field Ambulance and one section of No. 19 Combined Clearing Hospital. Their orders were to

land at a spot selected by the senior naval officer, then to co-operate with the naval force and clear the left bank of the river up to and beyond Qurna, and afterwards to cross the river and attack the village of Qurna. If this was impossible they were to hold on and await reinforcements. On the 4th December 1914, Colonel Frazer's force attacked the enemy on the left bank of the river and drove him out of his positions, but his small force could not cross the river in face of the opposition shown and, as he had no transport to bring up supplies, ammunition or baggage, he returned to camp to await reinforcements. It was there reinforced by a column consisting of the 18th Infantry Brigade and other troops, with the bearer sub-divisions of another section of No. 16 British Field Ambulance and two sections of No. 126 Indian Field Ambulance. On the 7th December, Maj.-General Fry stormed and cleared the enemy's position at Mazira, a village opposite Qurna. The advance took place over an absolutely level and bare plain intersected by water cuts. The casualties in these actions are shown in the tables on p. 177.

On the next day two Indian regiments of the force and a section of the 30th Mountain Battery crossed to the right bank of the river above Qurna, supported by a British regiment on the left bank. But darkness prevented their pressing on against the Turkish trenches north of Qurna. The total casualties were 23 other ranks wounded.

At 8.30 a.m. on the 9th December 1914 the Turkish force in Qurna surrendered and the Union Jack was hoisted over the town at 2.30 p.m. The casualties were caused by shrapnel and rifle fire. The evacuation of wounded was easily accomplished. No transport was used except stretchers, and on these the wounded were carried from the regimental aid posts to the advanced dressing station on the riverside from whence they were embarked on river steamers, staffed by No. 19 Combined Clearing Hospital, and taken to the British and Indian general hospitals which had now been opened at Basra.

The 18th Infantry Brigade, less one Indian infantry battalion, was withdrawn inside the defensive line at Qurna and encamped there. The area occupied was unhealthy owing to the pollution of the soil and the unlimited number of Anopheline larvae developing in the numerous marshes and creeks.

By this time Basra had become organized as the base and general headquarters of the Expeditionary Force. Troops were accommodated in rough billets. A native chief's palace, a

large building on the right bank of the river, was taken over by No. 3 British General Hospital. Additional accommodation was provided by erecting reed huts in the vicinity of this building. No. 9 Indian General Hospital was also opened in huts on a site below the palace.

Basra itself was safeguarded from attacks from the north, as the position at Qurna commanded both the Tigris and Euphrates routes. The Turks, however, were threatening the British right and left flanks at Ahwaz and Shaiba respectively. A British force, consisting of two Indian battalions with a few guns, under Brigadier-General Robinson, was sent out early in February to reinforce the 7th Rajputs at Ahwaz, on the Karun river. Its chief duty was to prevent interference with the oil supply of the Anglo-Persian Oil Company, to support the Sheikh of Mohammera, who was friendly to the British, and to defend Basra's right flank from attacks, made possible by incursions of Turkish raiders into Persian territory. General Robinson's force attacked the Arabs and Turks concentrating some miles upstream from Ahwaz. Open fighting took place, but the British force was obliged to retire on Ahwaz. While they were retiring, great difficulty was experienced in getting the casualties away, and in spite of the efforts of regimental medical officers and stretcher bearers many of the wounded had to be abandoned to the enemy. The field ambulance taking part in the operations near Ahwaz was supplied for the first time with a form of wheeled transport. Two-wheeled local carts driven by Persian drivers were requisitioned. The drivers, however, fled on coming under fire; the animals stampeded; the carts stuck in the mud and had to be abandoned. The stretcher bearers, under cover of supporting troops, did their utmost to get as many wounded as possible back to the entrenched position on the riverside, where the field ambulance and two sections of No. 19 Combined Clearing Hospital had been opened. The wounded were ultimately evacuated by river steamer to Basra. General Robinson's force was subsequently reinforced by a section of an R.F.A. battery and half an Indian infantry regiment.

The defensive outpost of Basra on the left flank was Shaiba, a strategic position some ten miles to the west across the desert. This was occupied by one battalion of the 17th Infantry Brigade, which moved out from Basra on 29th December 1914. Shaiba itself was a series of fortified houses on the eastern margin of the Arabian desert. The main building

to the south was occupied and its environments entrenched and fortified. It was in a very insanitary condition, the latrines being chiefly in the angles of the rooms of the house and situated over cess-pools which had been rarely, if ever, cleaned out. Much labour was required to render it habitable. The water supply, however, was obtained from a good well. The water was hard and was particularly free from organic impurities. This well provided a sufficient supply of water for drinking and cooking for one brigade.

By 11th April 1915 the Shaiba garrison had been considerably increased, and consisted of the 16th Brigade, the 18th Brigade, the Cavalry Brigade with additional artillery and divisional troops. The 30th Brigade and the 30th Mountain Battery had also been ordered to proceed to Shaiba on the 12th April, but only the general officer commanding, some members of the 6th Division staff and the majority of the 24th Punjabis reached there on the 14th of the month. The medical units at Shaiba were Nos. 2 and 3 Field Ambulances, three sections of No. 131 Cavalry Field Ambulance and two sections of No. 57 Stationary Hospital.

Eight miles of the desert between the fortified position at Shaiba and Basra were under water to a depth of from one to four feet during the flood season. There were two methods of approach, either by wading across six miles of water and landing near old Basra, or by sailing bellums across this temporary lake.* These bellums were used to bring supplies from Basra and to evacuate sick and wounded on the return journey. Frequent raids by hostile cavalry on this line of communication necessitated the protection of all convoys, and cavalry skirmishes frequently took place round Shaiba between the opposing cavalry forces, but the casualties were never very heavy. They were brought into Shaiba on riding mules.

The Turkish force at the commencement of the fighting was estimated at one regular cavalry regiment, 12,000 regular Turco-Arab infantry, 32 guns and 11,000 Arab tribesmen. The enemy attacked the Shaiba position in the early morning of the 12th April, but without success, and by 2.30 p.m. on the following day the whole vicinity of the camp was cleared of the enemy. His casualties were estimated at 1,000, while over 400 prisoners were taken. Shortly after dawn on the 14th April, considerable bodies of the enemy were again seen in the neighbourhood of Shaiba, and the whole of the British

* A bellum is a keelless native boat. See Chapter XXIII., p. 654.

force, less two Indian regiments and three field guns, went out at 9 a.m. to engage them. A battle was fought, lasting until the evening, when the enemy abandoned his trenches all along the line. At one time during the day, it was thought that the British force might have to retire, and all the available transport was ordered up from Shaiba to assist in the collection and evacuation of the wounded.

During the later stages of the battle it was impossible to bring the stretcher cases back to the advanced dressing station. Any attempts which had been made resulted in the stretcher bearers becoming casualties. The hail of bullets, shrapnel and rifle, over an area some 1,500 to 2,000 yards behind the British firing line, effectually prevented the bearer divisions of the field ambulances with the 16th and 18th Brigades maintaining contact with the regimental aid posts of the battalions in action. Regimental medical officers also found it difficult to maintain contact with the officer commanding their battalion owing to the wide area over which the troops were extended. The common method of communication was for the officer commanding to send back a message by a slightly wounded man, but the difficulties of communication were increased by the fact that, owing to casualties, there were in many of the battalions two or three successive commanding officers. No definite and distinct regimental aid posts could be established and medical officers had to crawl about with the stretcher bearers, attend any case they could reach and as far as possible collect and protect the more seriously wounded. The duties of these regimental medical officers were all the more difficult on account of the critical position. The enemy's line overlapped the British and all had to be prepared for a hurried retreat, a disturbing thought as the abandoning of wounded to Arab cavalry meant death with possible mutilation. When the enemy's position was taken the bearer divisions were able to come up, but even then the task of collecting and evacuating a thousand casualties, scattered over a wide front was not easy. The wounded were, however, collected and taken to the advanced dressing station and those who could not walk were conveyed to Shaiba, a distance of two or three miles, in the vehicles ordered from Shaiba. This transport consisted of two-wheeled springless wooden carts with iron barred floors. They were drawn by mules or ponies and were quite unsuited for carrying wounded. All the wounded reached Shaiba by 8.30 p.m. on the 14th April and were accommodated in hospital buildings and tents

erected by the field ambulances and stationary hospital. Slightly wounded patients were fed, redressed and returned to their units to be further attended to by the regimental medical officer. This was considered necessary as every available man was required in view of possible eventualities. Furthermore, the hospital accommodation was not sufficient to house all the wounded. Some hundreds of the enemy's wounded were also brought into Shaiba the next day. The hospital staffs were hard worked and it was impossible to carry out thoroughly the surgical treatment many of the wounded required, as the numbers were great and evacuation was delayed for a day or two until reconnaissances revealed the fact that the enemy had withdrawn to Nasiriya and that communications with Basra were no longer threatened.

Conditions were not favourable for the transit of large numbers of wounded across the roadless swamp to Basra, but the arrangements, considering the difficulties, worked well and every effort was made to render the patients as comfortable as possible. For the first part of the journey, from Shaiba to the water's edge, a distance of about a mile, stretchers and transport carts were used. A special station was opened at the end of this stage and all wounded were fed and examined and were then placed on specially prepared small bellums, each of which could carry two lying down cases. At the Basra end of the water journey, the Zobeir Gate of the city, the wounded were received in a rest station, opened by No. 19 Combined Clearing Hospital stablished in a date grove. From there the more serious ases were transferred to larger bellums, twelve of which had been specially obtained for the evacuation of the wounded nd in these they were conveyed to the general hospitals. A number of the more dangerous cases, such as penetrating ead, thoracic and abdominal injuries and fractured thighs, ere conveyed direct from Shaiba in small bellums to the eneral hospitals, but this could not be carried out in all cases s the small draft bellums were urgently required to return aily to Shaiba with provisions. Cases of slight injury were nveyed from the rest station in transport carts, a few motor rries and in one motor ambulance car to the rest camp where ey were put on board a river steamer and taken on it to e general hospitals. As No. 19 Combined Clearing Hospital as not provided with army bearer corps personnel, bearer b-divisions were detailed from field ambulances to help loading and unloading wounded. Serious cases unfit to

continue the journey to the general hospital were retained at the rest station, where they were fed and redressed for the night, and sent on next morning.

The total number of wounded transferred from Shaiba to the general hospitals between the 14th and 22nd April 1915 was thirty-six British officers, 201 British other ranks, fourteen Indian officers, 655 Indian other ranks, and nine followers, making a total of 915. The enemy's casualties were estimated at six thousand, but only four officers and 161 other ranks were admitted to British medical units. They were evacuated on the 14th and 18th April. The time taken to transfer wounded from Shaiba to the general hospitals in Basra averaged about seven hours.

While preliminary operations were being carried out in the vicinity of Basra the 6th Cavalry Brigade and the 33rd and 30th Infantry Brigades, accompanied by heavy artillery and some special units, were being disembarked at Basra. A corps was then formed, composed of the 6th and 12th Indian Divisions, and General Sir John Nixon assumed command of the force on 9th April 1915, in place of Lieut.-General Sir Arthur Barrett, who returned to India on sick leave. The 6th Division, composed of the 16th, 17th and 18th Infantry Brigades, was commanded by Major-General C. B. F. Townshend; the 12th Division, composed of the 12th, 30th and 33rd Infantry Brigades, was under the command of Major-General G. F. Gorringe. Surg.-General H. C. Hathaway was appointed D.D.M.S. of the force and joined General Nixon's staff on 23rd April, relieving Colonel Hehir, who had accompanied the 6th Division as A.D.M.S. and had been officiating as D.D.M.S. of the force until General Hathaway arrived. Captain W. Heywood Hamilton, I.M.S., accompanied General Hathaway as his D.A.D.M.S. Lieut.-Colonel G. B. Irvine, I.M.S., who commanded No. 9 Indian General Hospital, was appointed officiating A.D.M.S. of the 12th Division. He was relieved a short time after by Colonel H. M. Adamson, R.A.M.C. Lieut.-Colonel Brown Mason, R.A.M.C. acted as D.A.D.M.S. of the 6th Division, and Major Horton, I.M.S., was appointed D.A.D.M.S. of the 12th Division.

The operations at Ahwaz and at Shaiba had cleared the enemy from the right and left flanks of the British force. The Turks were retreating on the right to Amara and on the left to Nasiriya.

The Medical Situation during the Early Operations.

The medical units of the original Indian Expeditionary Force were Nos. 16 and 17 British Field Ambulances, Nos. 125, 126 and 127 Indian Field Ambulances, No. 19 Combined Clearing Hospital equipped for 200 beds, No. 57 Indian Stationary Hospital, two and a half sections of No. 3 British General Hospital, an X-ray section, No. 9 Indian General Hospital and No. 8 Advanced Depôt of Medical Stores. These units had been reinforced in March 1915 by three sections of No. 131 Indian Cavalry Field Ambulance and No. 106 Combined Field Ambulance, composed of one British section and three Indian sections.

By the middle of February the field ambulances were reorganized. Nos. 16 and 17 British Field Ambulances and Nos. 125, 126 and 127 Indian Field Ambulances, all of four sections each, were converted into four combined field ambulances of five sections, two British and three Indian. The four new field ambulances were designated Nos. 1, 2, 3 and 4 Combined Field Ambulances.* It was intended to allot them as follows :—

6th Division .. Nos. 1 and 3 Combined Field Ambulances.

---

* The varieties of field ambulances employed in Mesopotamia were very numerous and confusing. The Indian Divisions were mixed divisions composed of a definite number of British and Indian troops. Each division had the Indian establishment of five field ambulances, two British field ambulances, known as B.F.As., and three Indian field ambulances known as I.F.As. These units consisted of four sections, A, B, C, D, with each section equipped for 25 patients, the B.F.A.s for British and the I.F.As. for Indian patients. Gradually reorganization took place and divisions were allotted four Combined Field Ambulances, known as C.F.As., composed of four sections, A, B, C, D. At first Section A in each unit was organized for the treatment of British casualties, but subsequently all the sections in a Combined Field Ambulance were equipped for both British and Indian patients.

Immediately this organization was formed a Combined Field Ambulance (C.F.A.) was apt to be confused with a Cavalry Field Ambulance also known as a C.F.A. and equipped for both British and Indians. This was overcome by designating a cavalry medical unit Cavalry Combined Field Ambulance, C.C.F.A.

When the 13th British Division arrived in Mesopotamia it brought into the country the British divisional organization of three field ambulances—these were known as F.As. Each field ambulance consisted of three sections, A, B, C, with each section equipped for 50 patients. The nomenclature of these units remained unchanged, but a certain proportion of Indian medical personnel was authorised and attached to each field ambulance to enable it to treat casualties from the Indian ranks and followers allotted to the division.

In Mesopotamia at one time there were the following organizations :—

3rd and 7th Divisions	Two B.F.As. and three I.F.As.
13th Division	Three F.As.
14th and 15th Divisions ..	Four C.F.As.
Cavalry Division	Two C.C.F.As.

12th Division ..	Nos. 2 and 4 Combined Field Ambulances.
Army Troops ..	No. 131 Indian Cavalry Field Ambulance.
	No. 106 Combined Field Ambulance.

According to war establishments, an Indian division should have five combined field ambulances, each consisting of two British and three Indian sections, or a total of twenty-five sections. When the reorganization of medical units in Mesopotamia took place, there were, however, only two combined field ambulances, consisting of five sections each, with each division, a totally inadequate provision of field medical units. The fighting formations, moreover, and their medical units were scattered over a large area of country. The 12th Division was proceeding against a hostile force in the neighbourhood of Ahwaz ; the 6th Division was in the neighbourhood of Shaiba, with its brigades under orders for Basra, Qurna and Darhamiyieh, in the neighbourhood of Basra ; the 6th Cavalry Brigade, less one regiment belonging to the Army Corps troops, was proceeding with the 12th Division. No. 1 Combined Field Ambulance was at Qurna—one British and one Indian section of this unit being under orders for Basra ; No. 2 Combined Field Ambulance was at Shaiba—the three Indian sections of this unit were under orders to proceed to Darhamiyieh and the two British sections were under orders to return to Basra; No. 3 Combined Field Ambulance was operating with the 12th Division in the neighbourhood of Ahwaz ; No. 4 Combined Field Ambulance was with the 12th Infantry Brigade at Ahwaz. No. 106 Combined Field Ambulance had two Indian sections at Basra with one British and one Indian section proceeding with the 12th Division ; No. 131 Cavalry Field Ambulance was also with this division. The sections of No. 19 Combined Clearing Hospital were in localities widely apart ; one section at Basra, one section at Ahwaz, and two sections with the 12th Division. No. 57 Indian Stationary Hospital had six sections at Basra and two sections at Shaiba. The two and a half sections of No. 3 British General Hospital were at Basra along with the six sections of No. 9 Indian General Hospital, the latter unit having an X-ray section attached to it. No. 8 Advanced Depôt of Medical Stores was opened in Basra and the sanitary section which had just arrived from India on the 22nd April was also there.

The following tables show the total number of wounded admitted to hospital up to this time, and the number of killed in these engagements.

Table showing Number of Wounded admitted to Hospital from 6th November 1914 to 14th April 1915.

Action.	Date.	British.		Indian.			Total.
		Officers.	Other ranks.	Officers.	Other ranks.	Follow-ers.	
Fao ..	6.11.14	—	—	—	3	—	3
Saniya ..	11.11.14	1	—	1	5	—	7
Saihan ..	15.11.14	2	35	—	16	—	53
Sahil ..	17.11.14	18	186	4	239	—	447
Mazira ..	4–7.12.14	6	36	4	152	—	198
Rota Canal	20.1.15	1	18	2	29	—	50
Mazira ..	29.1.15	1	1	—	4	—	6
Shaiba ..	3.3.15	2	—	—	10	—	12
Ahwaz ..	3.3.15	4	4	4	103	—	115
Shaiba ..	16.3.15	—	—	1	4	—	5
Shaiba ..	12–14.4.15	36	201	16	672	10	935
		71	481	32	1,237	10	1,831

Table showing Number of Killed in Actions up to 14th April 1915.

Action.	Date.	British.		Indian.			Total.
		Officers.	Other ranks.	Officers.	Other ranks.	Follow-ers.	
Saniya ..	15.11.14	—	6	—	3	—	9
Sahil ..	17.11.14	2	25	—	27	—	54
Mazira ..	4–7.12.14	—	3	1	24	—	28
Rota Canal	20.1.15	—	—	—	7	—	7
Mazira ..	29–30.1.15	—	—	1	1	—	2
Shaiba ..	3.3.15	4	—	1	5	—	10
Ahwaz ..	3.3.15	5	1	—	11	—	17
Shaiba ..	12–14.4.15	13	55	11	98	5	182
		24	90	14	176	5	309

The total number of admissions for disease was 73 British officers, 1,223 British other ranks, 43 Indian officers, 4,108 Indian other ranks and 1,735 followers, making a total of 7,182.

The disease incidence of the force cannot be given for the whole period, but it was worked out per 1,000 of strength for five months as follows :—

Percentage Admissions for Disease to Strength.

Date of estimation.	British troops.	Indian troops.	Followers	Whole force.
28.12.14	4·28	4·66	2·36	4·05
24.1.15	2·96	3·99	3·47	3·67
9.2.15	4·11	3·96	3·73	3·93
13.3.15	2·31	3·80	3·65	3·47
6.4.15	2·08	2·82	4·21	3·04

The general health of the force up to April 1915 was satisfactory; that of the British and Indian troops was excellent while that of the followers was fair. At the beginning of the campaign the troops were marching and fighting continually; supply difficulties were overwhelming; many men lost their overcoats and waterproof sheets and some units lost their cooking utensils in the storm on the river; the duties connected with the construction of defence works, outposts, supply convoys, work in the trenches, road making and preparing embankments to keep out flood waters were all severe, but victory had always been their portion and the men were invariably cheerful and in surprisingly good spirits. The troops who had occupied and fought at Shaiba and who had just returned to Basra were a little worn from hard work and exposure, and one Indian regiment, the 104th Wellesley's Rifles, was suffering to some extent from scurvy.

The medical officers who had accompanied the force to Mesopotamia were all regular officers who had served an apprenticeship in the East. They were seasoned to the tropics, accustomed to field sanitation and understood their duties as medical officers of health to troops in the field. These factors were important in preserving the health of the force. Another factor that must be considered important was a pamphlet, entitled "Field Service Needs for Regimental Officers," which had been drawn up and issued by Colonel Hehir to all medical officers and medical subordinates. Few medical officers in any theatre of war had the advantage of receiving and digesting such a concise, instructive and sympathetic guide to their duties. The work of the regimental medical officer, assistant surgeons and sub-assistant surgeons attached to units was carried out successfully and efficiently. In the field under fire, in bivouac, camp and billet, the work of the field ambulances was always efficiently accomplished. The combined clearing hospital worked satisfactorily and was an important link in the scheme of the evacuation of casualties. The only difficulty

experienced at this time was the absence of army bearer corps personnel, but this was overcome by detailing bearer subdivisions from the field ambulances to the combined clearing hospital for the loading and unloading of casualties. The forms of ambulance transport which were available were river steamers, large and small mahelas,* bellums, riding mules and field stretchers, Army transport carts, occasionally motor lorries and one motor ambulance car. On the river and over lakes no great difficulty had been experienced in bringing sick and

Type of mahela used in 1914–16 for transporting military stores, Mesopotamia.

wounded back to the general hospital. The use, however, of these waterways and the comparative ease with which evacuations were carried out no doubt postponed demands for modern methods of transport, and instilled the idea that fewer field ambulances for the divisions and hospitals for the lines of communication were required for a force operating in Mesopotamia.

The Indian stationary hospital at the commencement of the campaign, had been used as an Indian general hospital. After the arrival of No. 9 Indian General Hospital in November 1914

* A boat similar in construction to the bellum but of larger size.

several sections of the stationary hospital were employed at Shaiba for some months, while the remaining sections formed a convalescent depôt for Indian troops and followers.

The general hospitals had not arrived in Mesopotamia until after the battle of Sahil. On arrival at Basra " A " section of No. 3 British General Hospital was opened in the palace of the Sheikh of Mohammera, a large two-storied building situated on the right bank of the Tigris. The ground floor was somewhat damp and dark, but the first floor was bright and airy. When it was first opened all casualties were brought to it. The sick of the troops in Basra were collected daily at the main supply depôt, a central point on the Shatt-al-Arab, whence they were brought to the hospital by steamer. The steamer on its return

River craft of the stern wheeler type on the Tigris.

journey, carried patients who had been discharged from hospital and were rejoining their units. At the palace a wooden pier was constructed to facilitate the landing and the embarking of cases. The building itself could accommodate 150 patients, and the wards were at first used by both British and Indian sick and wounded. As the number of British troops increased only British casualties were accommodated in the buildings while the Indian troops and followers were treated in European pattern tents pitched in the compound of the palace. Considerable work was done to make the building conform to the requirements of a modern hospital. Fireplaces were made, the walls and floors of the operating theatre were covered with cement, a skylight was constructed and electric light was installed. As an extension was required reed huts were erected

in the compound. At first there was a great shortage of bedsteads and the patients lay on mattresses on the brick floors of the palace or on the ground in tents. Local Arab bedsteads, costing one rupee each, were obtained and used until iron bedsteads were sent from India. A portable steam disinfector was used extensively to sterilize the clothing and bedding of the infectious cases and the garments of lice-infested men. Its capacity however was limited and it could not cope with all the work that required to be done.

No. 9 Indian General Hospital was opened in European pattern tents erected on three level plots of ground immediately to the south of the British general hospital. The tents, provided with tent boards, formed three groups. One block was used for infectious and venereal cases. The Shatt-al-Arab and the creeks to the north and west of this hospital threatened to overflow their banks and this was only prevented by daily attention to the embankment. In April, however, the plot of ground occupied by the infectious group of tents became waterlogged and had to be temporarily abandoned. The cases were then transferred to the " Franz Ferdinand," a captured enemy ship which was being used at the time as a convalescent depôt. About the middle of April the European pattern tents of the two other groups were replaced by reed huts.

The diet of the sick and wounded in both hospitals was good and the unofficial funds at the disposal of the respective commanding officers enabled them to provide various articles of food and luxuries not obtainable from the supply depôt.

Attached to the Indian general hospital was an X-ray section. This arrived in Basra during the first week of December 1914, the officer in charge of the section coming on one steamer, his apparatus which was incomplete on another. The dynamo was defective, but the officer managed to charge his accumulators from a dynamo used by a commercial firm in Basra or from the electric plant of the hired transports and wireless station. A dynamo and small engine were subsequently provided but were never sufficient for the work the section had to do.

On 11th December 1914, a convalescent depôt was established at Magil, the port of Basra, situated upstream of the town. It was subsequently closed and reopened for Indian troops and followers, first on the " Franz Ferdinand," and when this ship was required for the overflow of cases from the general hospitals after the battle of Shaiba it was transferred to Camp Makina, on the border of the desert, and occupied reed huts. The

personnel was temporarily supplied by No. 57 Indian Stationary Hospital. The first British convalescent depôt was opened at the British base depôt, Basra, on 15th April 1915.

The advanced depôt of medical stores arrived in Basra at the beginning of December 1914, and was opened in close proximity to the main supply depôt. The supply of surgical dressings which this unit brought was insufficient to meet the requirements of the units, but fortunately boxes of surgical dressings and medicine had been put on board the hired transports for the use of troops on the voyage from India. These boxes proved of great assistance in replenishing the supplies. Soon after its arrival the advanced depôt of medical stores indented for a large quantity of stores from India and when these arrived they replaced the drugs and dressings expended at the battle of Shaiba. As the force was increased to two divisions this unit became no longer capable of meeting all the demands made upon it and an additional advanced depôt of medical stores was cabled for about the middle of April.

No sanitary section accompanied the original force. Brigades formed sanitary squads and attended to such sanitary requirements as could not be carried out by unit sanitary detachments. The need of a sanitary section for duty at the base and on the lines of communication was experienced from the beginning of the campaign. As the force increased in size the lack of a sanitary section became more and more evident. A sanitary section, therefore, with a competent sanitary officer in command was cabled for to India. It arrived on 22nd April 1915.

The lack of a dental surgeon was also felt at a very early stage of the campaign. This want necessitated many officers returning to India solely for the purpose of getting either new dental plates or their old plates repaired. In February 1915 application was made for an assistant surgeon with a special knowledge of dentistry.

The casualties were evacuated from Basra to India by the hospital ship "Madras"—which was provided by the Madras Presidency, neither care nor money being spared in making the ship a model of what a hospital ship should be—and by hired transports, such as the "Varela" and "Varsova." These last were also employed from time to time as overflow hospitals for the sick from the general hospitals in Basra. On the "Madras" the sick and wounded were thoroughly well looked after by a staff of medical officers and nurses. The dieting arrangements for British and Indian invalids and the sanitation of the vessel were satisfactory. During

the period under review a liberal supply of gifts was received from the Red Cross Society in India. These gifts added considerably to the comfort of the sick and wounded, were immensely appreciated by the patients, and were invaluable to the officers commanding medical units.

The health of the force as a whole was largely dependent on the provision of a good water supply and on the efficient sanitation in bivouacs, camps and towns, especially at Basra. Recommendations regarding diet, clothing and extras such as the provision of spine pads, mosquito curtains and tinted glasses all formed part of the responsibility of the D.D.M.S. The medical administration during this early period was hall-marked by its training in peace time in India. Medical officers and personnel had been taught to make the most of everything and improvise articles not sanctioned by War Establishments and Mobilization Store Tables. This they certainly did in Mesopotamia. The country was far off from India and farther still from the United Kingdom. These are points which should always be remembered in considering the early days of the campaign. Initiative had been dulled by many years of economy in India and this probably explains why ambulance wagons, motor ambulance cars, motor launches, hospital river steamers, extra units and all the modern equipment so readily provided for the force in France were not even asked for by the headquarters of the Indian Expeditionary Force in Mesopotamia.

The Operations leading to the Occupation of Amara.

After the Turkish left and right wings had been disposed of at Shaiba and on the Karun, it was decided to attack the Turkish force which had remained encamped several miles above Qurna, break up that centre force and proceed to Amara. On 31st May 1915 Major-General Townshend, with the 6th Division, attacked this force. The division was accompanied by Nos. 1 and 2 Field Ambulances, two sections of No. 106 Combined Field Ambulance, and two sections—one British and one Indian—of No. 19 Combined Clearing Hospital. The advance to Amara began with the second battle of Qurna, which has been described as the most amphibious action that the British Army has ever fought.

The dominating physical features of the country were the river Tigris, the flooded country north of the Qurna and the extensive marshes between Qurna, Qalet Salih and Jahala

Canal. The river, which has an average width of about 130 to 140 yards from Qurna to Ali Gharbi, pursues a tortuous course especially below Amara, bending here and there so abruptly as to make the navigation of larger steamers extremely difficult. Until the Pusht-i-Kuh Mountains become visible to the east of Qalet Salih and Amara the whole country is a perfectly flat plain, and with the exception of the date groves and orchards in the vicinity of the largest villages it is devoid of trees. As the country is below the flood level of the river a large part of the district is under water to a depth varying from one to three feet for several months of the year. The only unflooded parts at this time were mounds, about thirty feet high, called by the force Norfolk Hill, One Tower Hill, Gun Hill, One Tree Hill and Barhan. The first three were situated on the right bank of the Tigris close to the river bank; One Tree Hill was situated on the left bank opposite Gun Hill, and each of these eminences, situated a few miles above Qurna, was defended by the enemy. The marshes were naturally obscured by the extensive floods but their positions were delineated by the tall reeds growing out of them. They were inhabited by the marsh Arabs, who roam about in small boats, known as mashufs, or dwell on the river banks in mat or hair huts of a primitive kind. The country on either side is also intersected by irrigation channels often eight feet deep, the banks of these channels and the depth of water even in dry weather forming heavy obstacles to the onward progress of troops. The Jahala Canal is a large volume of water that breaks off from the left bank of the Tigris immediately at the north of Amara and after a short course eastward bends to the south and forms the northern and eastern boundary of the town. The weather was moderately hot at the end of April. It became progressively more so in May and June when it was decidedly tropical. During these months the high temperature was associated with a considerable degree of humidity and as was to be expected this caused a large number of cases of heat stroke or heat exhaustion. The British troops were conveyed from Basra to Qurna in river steamers and iron barges on which the heat was very oppressive. Many cases of heat stroke occurred on the voyage and the medical personnel was kept fully employed in attending to them.

The Turks main position was at Barhan. Their advance positions were on Norfolk Hill, One Tower Hill, Gun Hill and One Tree Hill. The Tigris down stream of Norfolk Hill was mined.

The British force was accompanied by a naval flotilla and the enemy position was attacked on 31st May. After a heavy bombardment by the naval flotilla and guns mounted on rafts the infantry attacked and were conveyed a certain distance in armed bellums and on rafts protected by steel plates and machine guns. Under cover of the bombardment One Tree Hill was stormed and carried, while a battalion of British troops, wading through water waist deep, carried the enemy's trenches on Norfolk Hill at the point of the bayonet. The enemy was driven from his positions and retreated at 1 p.m. on 1st June up the river Tigris on steamers and mahelas pursued by the British gunboats. General Townshend did not delay but closely followed up the retreating enemy and occupied the town of Amara on 3rd June. The British casualties amounted only to twenty-five while 1,773 prisoners, seventeen guns, four river steamers and several barges were captured by the 6th Division.

Special medical arrangements were made for this action. Two special ambulance mahelas or barges had been adapted at Basra for conveying sick and wounded. They were equipped with one ice box, a Persian heater and twenty-five pillows and mattresses stuffed with hay. They were attached to No. 2 Field Ambulance. Special ambulance rafts were also constructed on bellums fixed two feet apart. Brackets were raised to provide shade and steering platforms were erected both at the bow and stern. The advanced dressing station personnel and equipment of No. 2 Field Ambulance proceeded on the mahelas which were towed by a paddle steamer.* At 9 a.m. on 31st May the advanced dressing station was opened on the dry ground captured by the infantry. The evacuation of wounded was entirely carried out by water, and after the cases were dressed they were conveyed on the ambulance barges to Qurna. There they were transferred to river steamers, previously fitted up with improvised beds, medical stores and comforts, and the journey down river to the general hospitals in Basra, a distance of forty miles, was thus made in comparative comfort. The casualties from heat and sickness which occurred farther up the river during the advance on and capture of Amara could not be so readily evacuated. They had to be carried on to Amara and many patients died from heat stroke. When the division reached Amara the field ambulances were allotted houses and had of necessity to be used as improvised hospitals.

* The paddle steamers were designated " P " boats and numbered.

After the entry into Amara the 6th Division sent out advanced troops and took over Kumait. They occupied this area until a further advance took place up the Tigris in September.

After the occupation of Amara No. 1 Field Ambulance had one British section and one Indian section at Qurna, and one British and two Indian sections at Amara ; No. 2 Field Ambulance was at Amara ; two sections of No. 19 Combined Clearing Hospital were on "P4" engaged in evacuating sick to Qurna ; two sections of No. 106 Combined Field Ambulance were with the 18th Infantry Brigade and did not join the 6th Division until later. The two sections of No. 1 Field Ambulance at Qurna continued to act as a lines of communication unit until 5th July, when they joined the rest of the unit at Amara. No. 9 Advanced Depôt of Medical Stores was sent up from Basra and arrived at Amara on 25th June 1915. Subsequently, on 15th July, a voluntary hospital provided by the Province of Bengal, the Bengal Stationary Hospital, was also sent to Amara and was opened two days later for Indians.

In Amara the troops were billeted partly in huts, while the remainder were encamped in European pattern tents. One British infantry battalion, however, was quartered in the Turkish infantry barracks, in the Turkish Governor's house and in huts specially erected. Each room in the Turkish barracks was intended to accommodate 100 men, but the barracks were in a very insanitary condition and had to be thoroughly cleaned and disinfected before being occupied. The Turkish Governor's house was a well constructed two-storied edifice, which housed about 200 British troops and some British officers. It was badly ventilated, but this was easily remedied. The huts erected for the British troops had thick brick walls, a brick floor and reed and mat roofs. Some of the other infantry units were billeted in large grain sheds on the banks of the river and canal. These were also badly ventilated, but when cleaned out and with a few alterations they were quite habitable. No. 2 Field Ambulance was billeted in some of the best houses in Amara, which, however, were scattered, thus adding to the difficulties of administration. No. 1 Field Ambulance was opened in huts situated in a date grove on the right bank of the river opposite Amara. Three battalions of the 17th Brigade and an Indian cavalry regiment were encamped in European pattern tents on the right bank of the river north and south of the village of Daffas opposite Amara. This village was in a very foul state when the British force arrived, every roadway and almost every compound having been used

as a latrine. One Indian infantry battalion, a troop of cavalry, some guns and a section of a field ambulance, were stationed at Kumait. They were housed in European pattern tents on an excellent grassy site, devoid, however, of any shade.

The chief duty of the medical service at this time was to improve the sanitation in the areas occupied by the troops. Their efforts were mainly directed towards purification of the drinking water, incineration of night soil and horse and mule refuse, dry refuse, cleaning of billets, improving their sanitation, construction of ablution places, supervision and proper cooking of rations, the isolation of infectious diseases and the prevention of their extension. In a country that was so prolific of flies as Lower Mesopotamia it was natural that whole-hearted attention should be paid to these points, as they were of the utmost importance in preserving the health of the troops. The sanitary supervision was mainly in the hands of regimental sanitary squads and improvised squads for detachments occupying outside posts. In June a detachment of the sanitary section which had arrived in Basra in April 1915 was sent to Amara, and did useful work in supervising non-regimental areas outside unit camps and billets. During this period there was a deficiency of sweepers, which added to the difficulties. Incineration of night soil was not satisfactorily carried out, and the spread of disease was given an impetus by the ever-increasing number of flies that bred out when incineration was incomplete.

The actual treatment of the sick was at first undertaken by the field ambulances which had become stationary hospitals. The two sections of No. 19 Combined Clearing Hospital, after evacuating the sick at the second battle of Qurna, were placed on board a paddle steamer and acted as a convalescent depôt, thus relieving to a certain extent the congestion in the field ambulances. The arrival of the Bengal Stationary Hospital, whose organization consisted of the equipment and personnel of eight sections of an Indian stationary hospital, also assisted in still further reducing the congestion. The paddle steamer "P4" was handed over to the medical service and was improvised for the evacuation of sick. Civil hospitals and dispensaries were opened in the city. The civil inhabitants were treated, and arrangements were made for carrying out a conservancy scheme. The health of the troops remained satisfactory until the first week in May, but from then until the middle of July the general health became indifferent. In the latter half of July the men picked up to some extent, and by

the beginning of August 1915 the sick rate was reduced to about half what it had been in June. The causes leading to this deteriorated state of health were many, but the chief were the trying climate and the hardships the troops had undergone. It was no easy matter for men to fight in a tropical country. This reduced their resisting powers and made them an easy prey to infection. The incidence of malaria had increased. This was not to be wondered at when it is remembered that one infantry brigade had for several months occupied Qurna and another Mazira, two of the most unhealthy places in the country. The approximate number of admissions for this period was 73 British officers, 2,147 British other ranks, 7 Indian officers, 1,295 Indian other ranks and 698 followers.

The principal diseases giving rise to these admissions are shown in the following table :—

Disease.	British.		Indian.			Total.
	Officers.	Other ranks.	Officers.	Other ranks.	Follow-ers.	
Malaria	30	849	3	245	238	1,365
Heat Stroke ..	4	534	—	31	21	590
Dysentery ..	2	90	—	158	238	488
Diarrhœa ..	3	30	—	70	25	128
P.U.O.	—	60	—	34	17	111
Debility	2	50	1	44	6	103
Bronchitis ..	—	9	—	41	15	65
Jaundice	1	33	—	18	4	56
Enteric	2	20	—	13	6	41
Venereal diseases	—	5	—	12	17	34
Scurvy	—	—	—	25	11	36
Colitis	—	18	—	1	2	21
Other diseases ..	29	449	3	603	98	1,182
Totals ..	73	2,147	7	1,295	698	4,220

In reviewing these statistics it must be understood that they do not represent the actual amount of sickness and inefficiency from disease in the 6th Division. A large number of men, more especially during June and July, were treated regimentally because the field ambulances had neither the personnel nor the equipment to cope with all cases of sickness. They do, however, represent the serious cases which were admitted to the field ambulances and, after 15th July, to the two other stationary hospitals. Much had been done to provide the troops in good time with everything that was then considered necessary for the comfort and well-being of troops

campaigning in a tropical country. Sun glasses and mosquito nets had been issued, spine pads were provided for the British troops and accommodation had been provided in billets, reed and mat huts and in European pattern tents. Prophylactic issues of quinine had been issued when the earlier cases of malaria had manifested themselves ; guards, fatigues and duties had gradually been reduced to a minimum and the closest attention had been paid to the cooking of the men's rations and to the sanitation of the camps. The outstanding failure of the medical service was the lack of the full complement of medical units, and failure to appreciate the immediate necessity for modern appliances, such as hospital steamers, motor ambulance cars, electric plant, ice and soda water machines.

The Operations on the Karun and Euphrates.

After the occupation of Qurna, operations to protect the flanks of the advance to Amara were conducted from the Karun river in Persian territory on the right of the Expeditionary Force, and up the Euphrates to Nasiriya on the left. The small force operating at Ahwaz, on the Karun, had been reinforced by the 12th Infantry Brigade of the 12th Division. The original force had suffered considerable loss in February, and in April the British troops at Ahwaz were hemmed in by eight battalions of Turks, supported by eight guns and 10,000 Arabs. It was decided to disperse this hostile force, and Major-General Gorringe, with the 6th Cavalry Brigade and the 12th Infantry Division less the 33rd Infantry Brigade, moved up the Karun river. This force was accompanied by No. 3 Field Ambulance, No. 106 Combined Field Ambulance, less one British section, and two sections of No. 19 Combined Clearing Hospital.

The country over which the force operated was very flat and no high ground was seen till the troops reached the Karkha river, on the north of which there was a low range of sandhills. Two large and rapid rivers flow through this area—the Karun, which is navigable by large river steamers up to Ahwaz, and the Karkha river, which is not navigable. The latter disappears for a long stretch in marshland and reappears in the Swaib canal, which runs into the Shatt-al-Arab, three miles south of Qurna. The soil was alluvial clay, very rich and fertile when irrigated. There was a long stretch of marshland on both sides of the Karkha river in the direction of Amara. During the operations of the force there was practically no rainfall, but high winds and severe dust storms were prevalent throughout

and the temperature sometimes rose to over 120° F. in the shade. These factors made it very unpleasant and trying for the troops especially when they were without tents owing either to lack of transport or the exigencies of the operation. The nights, however, were cool and acted as a tonic to the tired troops.

The 12th Division engaged the enemy on the 24th April and drove him from his position. He retreated up the Karkha river, followed by the British force, which crossed the river on 7th May, but the Turks once more retreated from their position, this time in the direction of Amara. General Gorringe then turned his attention to a gathering of hostile Arabs, who had collected at Khafajiya. They were dispersed and their villages destroyed. Casualties caused by wounds were few—only two British and twenty-eight Indians wounded. They all occurred during the attack on the Arabs. The wounded were dressed at the advanced dressing station and evacuated by motor lorry and one motor ambulance car to a field ambulance situated fourteen miles farther back. From there they were transferred to No. 19 Combined Clearing Hospital and No. 4 Field Ambulance at Ahwaz and evacuated by river steamer to Basra.

The field ambulances moving with the 12th Division during its operations up the Karun river had to do without their heavy equipment and travelled more as bearer divisions than as complete field ambulances. Only three tents per section were carried.

If the number of wound casualties was small the casualties from sickness were high, and more than 3,000 cases, mostly malaria, diarrhœa, dysentery, colitis, pyrexia of uncertain origin and minor septic sores, passed through the field ambulances between 23rd April and 18th June 1915. The medical units were always full and were totally unable to cope with the large number of sick. They, however, did their utmost for the comfort of the sick and wounded.

A brigade and some divisional troops of the 12th Division, after the operations on the Karun river, returned to Basra and advanced towards Nasiriya, on the Euphrates, where the enemy had assembled in force after the battle of Shaiba.

Qurna was the starting point of the force operating up the Euphrates towards Nasiriya. Troops had to be conveyed up the Euphrates and across a wide lake known as the Hamar Lake. When the river was low the water in the lake only permitted shallow draft bellums to cross. In July the country

was flooded and the river was high, and steamers drawing five feet could cross the lake and reach Hakika. Towards the end of July the water gradually falls, and in August there was only three feet of water in the main channel.

The Turks had made an obstruction below Hakika, but the British force and the naval gun boats accompanying the force managed to pass this obstruction by the 4th July, and continue their advance to a position two and a half miles east of Hakika. The Turks had an advanced position in this neighbourhood, but the 30th Brigade attacked it successfully, capturing 132 prisoners and 4 guns, and losing 25 killed and 86 wounded. The Turkish force retired to its main position astride the Euphrates, several miles below Nasiriya. This position was a very strong one as its flanks rested on marshes on each side and it could only be taken by a frontal attack. The British force was encamped at Asani, two miles downstream of the enemy's position; on the 11th and 12th reinforcements arrived and an unsuccessful attack on the Turkish positions was made on the 13th and 14th July. For the next ten days the troops were rested as much as possible while further reinforcements arrived and more definite preparations for another attack were being made.

Early on the morning of 24th July determined attacks on the enemy positions were made by the 12th Brigade on the left bank and the 30th Brigade on the right bank. These attacks were successful, the enemy's trenches were captured and the Turks retreated to Sadanawiya, the British troops following them quickly and driving them from this position. The enemy then retreated in the direction of Shatra, and on 25th July 1915 the British occupied Nasiriya without further opposition.

During these operations the British casualties amounted to 164 killed and 746 wounded, while 1,000 prisoners and 17 guns were captured.

For the operations on 5th July a dressing station was organized on the decks of the river steamer "Mejidieh," collecting posts were formed on both banks of the river and bearer divisions cleared the casualties from the regimental aid posts. After the action the cases were evacuated to the "Mejidieh." Three days later this boat sailed downstream for Basra with 81 wounded and 107 sick on board, accompanied by a convoy party detailed by No. 3 Field Ambulance. For the unsuccessful attack on 13th July, No. 3 Field Ambulance detailed a bearer sub-division to clear the regimental aid posts, while a section of No. 131 Indian Cavalry Field

Ambulance opened a dressing station at Asani. As there were only six field ambulance sections with the division, and convoy parties had to be provided from these sections, the A.D.M.S. of the division asked that another field ambulance might be sent up to the force. Additional personnel for No. 3 Field Ambulance, along with four sections of No. 106 Combined Field Ambulance and one section of No. 1 Field Ambulance, were at once promised, and two of the sections of No. 106 Combined Field Ambulance and the section of No. 1 Field Ambulance arrived at 4.30 p.m. on the 19th July. The other two sections of No. 106 Combined Field Ambulance never reached the 12th Division. They were delayed at Qurna, and after they were sent on from there the steamer on which they sailed was stranded in the Hamar Lake, and the two sections of this unit ultimately returned to Qurna. The bearer divisions of the fresh units which had arrived were used to relieve the bearer divisions of No. 3 Field Ambulance and No. 131 Indian Cavalry Field Ambulance. When the attack on 24th July commenced No. 3 Field Ambulance sent a party of army bearer corps personnel to assist the unit operating on the right bank, and they formed a dressing station near the 38th Brigade headquarters. Another bearer sub-division of No. 3 Field Ambulance was held in reserve along with tent divisions of No. 106 Combined Field Ambulance, and they formed dressing stations on the right and left banks. After the attack, wounded were collected on the banks of the river and were evacuated by steamer to the tent divisions at Asani. On the following day a convoy of 329 wounded and a few sick were sent to Basra, on the "Mejidieh," and on the 27th July one section of No. 1 Field Ambulance and a British section of No. 3 Field Ambulance proceeded upstream to join the 18th and 30th Brigades respectively, being followed on the 29th by the A.D.M.S., a section of No. 106 Combined Field Ambulance and 110 sick. By 30th July 500 patients had been collected into Nasiriya, and as the D.D.M.S., G.H.Q., had ordered the withdrawal of three of the ambulance sections from the 12th Division, the A.D.M.S. asked for two sections of No. 19 Combined Clearing Hospital to be sent from Qurna to Nasiriya.

The evacuation of the sick and wounded from these actions to the base was bad and very trying to the patients. The river steamers and barges had brought up troops, animals and stores on their upward journey, and the military necessity was such that no time was allowed for the medical personnel to clean or disinfect the vessels before the sick and wounded were placed

on board. The medical convoy party on board was very small and all its time was occupied in dressing the patients. The supply of medical comforts was deficient. The journey downstream lasted several days. Under ordinary circumstances this journey, even to a healthy man, was a most uncomfortable experience; but to the many wounded crowded on board, surrounded by insanitary conditions, lying on the hard decks and receiving the minimum of attention or comforts, it must have been a torture. There appears to have been no co-operation between the A.D.M.S. of the division and the D.D.M.S. at G.H.Q. No plans of evacuation seem to have been drawn up. No convoy parties were arranged for and the lessons of these actions do not seem to have been fully realized. That this is so, is borne out by the fact that the D.D.M.S., G.H.Q., in a report to Simla, simply states there were difficulties in evacuation. He neither asked for motor boats nor recommended the provision of river hospital steamers. He did, however, ask on the 13th August for a steamship with carrying capacity for 150 cases or for a tug capable of drawing two mahelas. Both these requests were refused by the Inspector-General of Communications on 18th August.

Nasiriya town, with a population of some 10,000 inhabitants, is situated on the left bank of the Euphrates. It lies east and west and has been well planned; in fact, it more closely resembled a European town than any as yet met with in the country. A large imposing building, occupying a site on the river front, was the Turkish barracks, in which a Ghurka regiment was billeted. These barracks were in a very filthy condition and the ventilation of the rooms was bad. There was also a Turkish hospital full of sick and wounded and it, too was in an indescribable state of filth. The other regiments were encamped on the right and left banks of the river.

The town was in a very insanitary condition. The night soil was disposed of in cess pits. There were accumulations of refuse everywhere and there were no public latrines and no conveniences. It was not until September 1915 that a comprehensive scheme was drawn up by Brig.-General H. T. Brooking, who had been appointed to the command of the force at Nasiriya, and a sanitary system was evolved which divided the town into areas, allotted gangs of street sweepers to each area and made provision for the necessary labour to deal with removal and disposal of filth and rubbish. Sites were selected throughout the town for conservancy depôts. Latrines, incinerators and accommodation for sweepers were built on

ten different sites. Measures for the treatment of waste places, ruined buildings and the general sanitation of the bazaars and the sanitary management of the food and supply shops were laid down.

The area surrounding Nasiriya was a good agricultural district and supplied an abundance of mutton and beef, the ordinary eastern vegetables, except potatoes, and fruits such as melons, grapes and dates. An ice factory had been found in the town, but certain of the essential materials were missing, In one of the British Territorial Force regiments, however, there were skilled engineers who were able to overhaul the plant and put it in working order.

With operations anticipated on the Tigris all troops but the 12th Brigade and some details and a field ambulance were withdrawn from this area. The health of the force had been remarkably good, considering the conditions, which were described by General Sir John Nixon in 1915 in the following words : " Seldom if ever have our troops been called upon to campaign in more trying heat than they have experienced this summer in the marshy plains of Mesopotamia."

CHAPTER VII.

THE ADVANCE ON BAGHDAD IN 1915.

THE capture of Nasiriya had established British control on the western side of the Basra Vilayet, but the district lying north of the line Amara-Nasiriya still remained outside British control and strong Turkish forces under Nur-ed-Din Bey were concentrated at Kut-al-Amara at the junction of the Shatt-al-Hai and the Tigris. Strong detachments from this enemy force had been moved down the Tigris to within thirty miles of Amara while the 12th Division was operating on the Euphrates. The defeat of Nur-ed-Din and the occupation of Kut-al-Amara were the next objectives of the British force.

The Shatt-al-Hai, a river flowing south from Kut-al-Amara to Shatrat-al-Muntafik, ceases to be navigable for some six months after the month of June, therefore the only line of advance on Kut-al-Amara was along the river Tigris. On 1st August, 1915, a detachment from the 6th Division, accompanied by a naval flotilla, occupied Ali Gharbi. Covered by this detachment the concentration of the 6th Division was carried out. Troops were transferred from the Euphrates to the Tigris—a slow process owing to the difficulties in crossing the Hamar Lake during the low water season.

By 12th September 1915 the force was concentrated at Ali Gharbi. The medical units with the 6th Division at Amara were No. 1 Field Ambulance less one section with the 12th Division at Nasiriya, and No. 2 Field Ambulance, the Bengal Stationary Hospital and No. 9 Advanced Depôt of Medical Stores at Amara. A section of No. 1 Field Ambulance and forty-one men of the army bearer corps personnel belonging to Nos. 1 and 2 Field Ambulances were under the orders of the 12th Division, which had been operating on the Euphrates. The field ambulances and other medical units had not been brought up to war establishments and to reinforce them was one of the difficulties with which the A.D.M.S. of the 6th Division had to contend. The reinforcements of the force and of medical units, which had to be brought up from other areas, was controlled by the transport available. Ultimately the following medical units were placed under the administration of the A.D.M.S. for the impending operations: No. 1 Field Ambulance of five sections, No. 2

Field Ambulance of five sections and No. 106 Combined Field Ambulance of four sections ; three sections of No. 131 Indian Cavalry Field Ambulance and two sections of No. 19 Combined Clearing Hospital. At Amara the hospital accommodation had been increased by the addition of sections of No. 2 British General Hospital equipped for 200 beds, a section of No. 3 British General Hospital, equipped for 100 beds, the Bengal Stationary Hospital equipped for 300 beds and two sections of No. 9 Indian General Hospital equipped for 200 beds. These were under the administration of the A.D.M.S. of the 12th Division, as this division had taken over the lines of communication between Ali Gharbi and Basra.

The D.D.M.S. of the force had made further arrangements on the assumption that Kut would be taken and occupied, when it was intended to bring there from Amara the section of No. 3 British General Hospital and the sections of No. 9 Indian General Hospital. These were to open at Kut and supplement those field ambulances which would not be required by the 6th Division in a further advance. Another section of No. 3 British General Hospital equipped for 100 beds and other two sections of No. 9 Indian General Hospital equipped for 200 beds were to be held ready in reserve at Basra, along with one section of No. 4 Field Ambulance and No. 57 Indian Stationary Hospital equipped for 200 beds. Accompanying the force was a naval flotilla of three vessels, two gun barges and nine river steamers. One of these the " Mosul " was set aside as a hospital ship ; the other vessels with their barges were allotted to the different columns of the force and carried their supplies and tentage.

The British force was organized into two columns, Column " B "commanded by Major-General C. I. Fry, with No. 106 Combined Field Ambulance less one Indian section ; and Column " A " commanded by Brigadier-General W. F. Delamain, with No. 1 Field Ambulance less one British section and No. 2 Field Ambulance less one British section. The British sections of Nos. 1 and 2 Field Ambulances and one Indian section of No. 106 Combined Field Ambulance were in reserve.

The general scheme of the medical arrangements was that the position of advanced dressing stations should be determined by the G.O.C. of the columns in consultation with the officers commanding the field ambulances. A divisional collecting station was to be opened by the tent sub-divisions of the sections in reserve. A site was selected for the collecting station near

the hospital ship " Mosul," which with the personnel of No. 19 Combined Clearing Hospital was to be the clearing hospital of the force. Field ambulance commanders were ordered to keep in touch with the supply service so that empty supply wagons could be utilized for the evacuation of sitting cases. The slightly wounded who were able to walk were to be marched back in groups to the divisional collecting stations while the lying-down and serious cases were to be retained and dealt with at a later period. Arrangements had been made for an improvised water supply ; 100 water containers made of water-proof canvas with a capacity of 50 gallons, losing by leakage twenty-five per cent. in twelve hours, and also 100 tin dippers were provided. These canvas tanks were attached to the ambulance wagons and transport carts and it was calculated that in this way two and a half pints of water for each man would be provided ; this, with the one and three-quarter pints in his waterbottle, and the pint obtainable from the regimental pakhal, would allow him just over five pints daily.

On the 26th September the 6th Division got into touch with the enemy, who had prepared a most formidable position astride the river, seven miles downstream below Kut. Column " B " made a feint attack on the enemy's centre or " horse-shoe " position on the left bank on 27th September, while the left bank detachment of Column " A " entrenched itself within 3,000 yards of the enemy. A bridge was constructed across the Tigris, and under cover of darkness the main body of Column " A " was transferred to the left bank, so that on the morning of the 28th the 16th and 17th Infantry Brigades of Delamain's Force advanced in two columns and attacked the enemy's left flank and rear. The 16th Brigade made a frontal attack while the 17th Brigade marched round the enemy's flank and attacked in the rear. By 2 p.m. the 16th and 17th Brigades had captured the whole northern part of the enemy's position, but the advance of the 18th Brigade was delayed. The 16th and 17th Brigades then attacked the enemy's reserves, advancing from the south. The operations met with success, and the enemy evacuated his positions, leaving behind 14 guns, 1,153 prisoners and nearly 1,000 dead.

The British casualties between 26th and 28th September were 4 British officers killed and 39 wounded ; 5 Indian officers killed and 27 wounded ; 11 British other ranks killed and 256 wounded ; 75 Indian other ranks killed and 791 wounded ; 9 British missing and 26 Indian missing, making a total of 1,243 casualties. Of these, 11 were killed and 79 wounded

on the right bank. They were easily evacuated by the "Aerial,"* and No. 106 Combined Field Ambulance. The casualties occurring on the left bank were cleared to Nos. 1 and 2 Field Ambulances, which had opened tent sub-divisions at Clery's Post, situated at the south-eastern corner of the Suwada Marsh north of Nakhailat. When the northern position was taken, the bearer sub-divisions collected the wounded in the enemy's trenches, but these were not easily evacuated. However, by 2.30 p.m. on 28th September, 370 casualties were brought back by using 100 transport carts, 32 mules, one motor ambulance car and two armoured cars.

The brigades which had made the turning movement and the final attack lost communication with their bearer divisions. No. 1 Field Ambulance was therefore ordered to hand over all its wounded to No. 2 Field Ambulance at Clery's Post and to get in touch with it. No. 2 Field Ambulance was ordered to send all its available transport forward to the enemy's trenches at the centre position to clear the wounded collected there, a guard accompanying them until they had evacuated their wounded. No. 1 Field Ambulance failed to get in touch with the 17th Brigade and was ordered to Es Sinn. At the same time the sections of No. 106 Combined Field Ambulance, which had been moved to the left bank were ordered to join the 17th Brigade. By 6.30 p.m. on the 29th, No. 1 Field Ambulance and two bearer sub-divisions of No. 2 Field Ambulance and the sections of No. 106 Combined Field Ambulance had arrived at Es Sinn, and had received the 216 wounded of the 17th Brigade. By midday on the 30th, No. 19 Combined Clearing Hospital had 257 sick in tents and 190 wounded on one of the paddle steamers to which it had been transferred from the "Mosul" on the 28th September. The divisional collecting station had 525 wounded cases. Clery's Post had by that time been cleared. All the sick and wounded had been fed and dressed, but suffered from the lack of blankets and suitable cover. The general scheme of evacuation from Es Sinn and Nakhailat, which was completed on 5th October, seems to have been that all cases slightly wounded and mild cases of sickness likely to recover within a month were taken on to Kut, while the more serious cases were evacuated downstream. A more unsuitable scheme could hardly have been devised. It was

* The "Aerial" was a private launch belonging to Mr. T. A. Chalmers, which had arrived at Basra on 26th August. It had a propeller like that of an aeroplane and was petrol driven.

contrary to all principles of evacuation laid down in Field Service Regulations, Part II, that the slighter cases of wounds should be carried forward with the advancing columns.

The striking force meant to advance and pursue the Turks. It had not its full complement of field ambulances ; instead of 5 field ambulances with a total of 30 sections it had only 3 field ambulances, or 14 sections. The personnel of these sections was exhausted, and had been depleted by sickness and the performance of extra duties. Much equipment had been expended during and after the battle, yet it was proposed to immobilize these units still further by again converting them into improvised stationary hospitals ; in fact, on 4th October there were 516 sick and wounded with the 16th and 17th Brigades when their field ambulances reached Kut. The serious cases that were evacuated downstream were placed on

Country around the Arch of Ctesiphon.

board any boat that was available. The personnel and equipment necessary for their treatment was the minimum that could be spared. The discomfort suffered by these patients was exceptionally trying, but merely typical of the standard prevailing in Mesopotamia at this time.

The Turks retreated from Kut to a previously prepared position astride the Tigris at Ctesiphon. The 6th Division had occupied Kut and pushed on an advance force to Aziziya, thirty miles below Ctesiphon. During the next six weeks, while the force was being reorganized and supplies brought up, the medical arrangements were also reorganized.

At the beginning of this period of reorganization the sections of the general and stationary hospitals, which were to have been sent to Kut, had not arrived. The A.D.M.S. of the 6th Division therefore informed his divisional commander that the medical units under his command were not sufficient for

the force and he recommended that a section of a British general hospital and two sections of an Indian general hospital should be sent up to Kut to take over the sick and wounded that were immobilizing the limited number of field ambulances of the force. These recommendations at first were not favourably received by G.H.Q., and consequently a strongly worded memorandum was forwarded by the divisional commander. Gradually the force of his recommendations was recognized and No. 4 Field Ambulance (three sections), No. 131 Cavalry Field Ambulance (two sections), No. 19 Combined Clearing Hospital, No. 9 Advanced Depôt Medical Stores, half a section of a British general hospital equipped for 50 beds, one section of an Indian general hospital equipped for 100 beds and No. 57 Indian Stationary Hospital equipped for 200 beds, were sent to Kut. The stationary and general hospitals were opened there. There was considerable difficulty in housing these units, but ultimately they were accommodated in billets, European pattern tents and in huts. The A.D.M.S. organized a convalescent depôt on the lines of the one he had organized in Amara. The new units which had been sent to Kut had to be drawn from Amara, Qurna, Nasiriya and Basra as the whole force was still deficient in medical personnel and units. No strenuous effort appears to have been made by the D.D.M.S. of the force to represent the actual conditions prevailing in Mesopotamia, the discomforts the wounded were experiencing, or the necessity for a more ample provision of medical units.

The medical difficulties in the 6th Division were not confined to the scarcity of medical units. The sanitation in the divisional area was bad, but it could hardly be otherwise for when an attacking force defeats an enemy, and hurries on in pursuit, sanitation is apt to be forgotten. Added to this, the areas left by the Turks were always indescribably filthy, and the last thing exhausted troops wished to do was to clean up the filth of their enemies. It always seemed to happen, too, that military necessity compelled the British force to camp on old Turkish camping grounds. Unceasing vigilance on the part of the A.D.M.S., and medical officers and strongly worded memoranda to unit commanders by the general officer commanding were necessary before the insanitary conditions were improved. The rations, too, were unsatisfactory and this, combined with the hard work previously performed, was no doubt responsible for the number of cases of beri-beri that developed in one of the British battalions.

While the 6th Division was at Aziziya the previous organization of the force into Columns "A" and "B" was cancelled and the division was reconstituted and consisted of a mixed Cavalry Brigade, and the 16th, 17th and 18th mixed Infantry Brigades. To provide medical units for these formations, the field ambulances were split up: one British and two Indian bearer subdivisions of No. 2 Field Ambulance were allotted to the 16th Brigade, one British and one Indian bearer sub-division of No. 2 Field Ambulance and one Indian bearer sub-division of No. 106 Field Ambulance to the 17th Brigade, and one British and two Indian bearer sub-divisions of No. 106 Field Ambulance to the 18th Brigade.

The division advanced on 18th October 1915, and two days later it concentrated at Lajj, a position eight to ten miles from the enemy, who was entrenched in two long lines of trenches, and between these lines was the archway of Ctesiphon. The 6th Division attacked this position on the morning of the 22nd November 1915, and after severe fighting they captured the first position, taking about 1,300 prisoners. Strong Turkish counter-attacks stopped attempts at a further sustained advance. The next day was spent in reorganizing the positions and collecting the wounded and on the 24th and 25th the wounded were evacuated to Lajj, where they were put on steamers and taken downstream. The 6th Division retired during the night of 25th November to Lajj, falling back further on the 27th to Aziziya, and then to Omm-al-Tubal where several of the steamers belonging to the British force were lost. The 6th Division remained here until the 1st December, when the Turks made a heavy attack in the morning, but were repulsed with great losses. General Townshend, taking advantage of a successful counter-attack, retired a distance of twenty-six miles to Shadi. His advance guard reached there on the same night. On the 3rd December the British force, greatly exhausted, arrived at Kut-al-Amara.

During the battle of Ctesiphon and subsequent retreat, the British force lost approximately 690 killed and 3,800 wounded, a loss of over thirty per cent. of the force. The mixed cavalry brigade left Kut on 6th December and moved back to Ali Gharbi and on the 7th the investment of Kut by the Turks was complete.

The medical arrangements of the 6th Division for the battle of Ctesiphon were based on the previous experience gained at Kut and Es Sinn. It is obvious that, with the units at the disposal of the A.D.M.S., no adequate arrangements could be made

for treating the wounded collected on the field of battle. At the same time there were two prominent defects in his arrangements, which had been made in consultation with the General Staff. The first was that all walking wounded were to be evacuated forward into Baghdad, a town still in the hands of the enemy; the second was the failure to appoint an embarkation medical officer and staff to arrange and supervise the embarkation of wounded at Lajj. Few wounded were evacuated to Lajj until the 24th, when they commenced to arrive in great numbers. Previously two of the steamers had been prepared in a rough-and-ready way for the more serious cases, but as the ever-increasing number of wounded arrived it became necessary to put them on board all vessels obtainable. But notwithstanding the defects and the deficiences of medical personnel, medical equipment or transport, all the wounded were eventually evacuated. This was a remarkable achievement carried out during a hazardous retreat when lines of communication were threatened and at times cut by marauding Arabs. Great credit must therefore be given to all medical officers with medical units and regiments for their devoted work in thus evacuating their wounded. There was no time to clean vessels soiled by accumulations of filth and dung; the one thing that was all-important was to get the sick and wounded on board and take them downstream. Under such conditions the wounded suffered considerably, sufferings which are better imagined than described.

The medical units left behind in Kut were No. 2 Field Ambulance (five sections), No. 4 Field Ambulance (three sections), No. 106 Combined Field Ambulance (four sections), No. 57 Indian Stationary Hospital, one half section of No. 3 British General Hospital, one section No. 9 Indian General Hospital and No. 9 Advanced Depôt Medical Stores.

CHAPTER VIII.

OPERATIONS FOR THE RELIEF OF KUT-AL-AMARA.

THE organization of the Kut relieving force, designated the Tigris Corps, under the command of Major-General Sir F. J. Aylmer, was commenced at Ali Gharbi, where some units of the 28th Infantry Brigade and the 6th Cavalry Brigade with most of the transport of the 6th Division had arrived. With them were No. 131 Indian Cavalry Field Ambulance and one section of No. 18 Cavalry Field Ambulance. The second section of No. 18 Cavalry Field Ambulance joined this force during the first week of January 1916. During the following week the other units of the 28th Brigade arrived, followed a few days later by the 36th Brigade bringing with it four sections of No. 20 Combined Field Ambulance, while two sections of No. 3 Combined Field Ambulance were sent up from Amara. There were thus at Ali Gharbi eleven sections of these various field ambulances.

The regiments of the 3rd Lahore and 7th Meerut Divisions, arriving from France and Egypt, were hurried up to join this relieving force, but the medical units of those divisions had not by this time arrived in the country. Many of the Indian regiments had not served in France. The method of splitting up medical units at Marseilles, embarking them on different transports and separating them from their formations was very reprehensible and added many difficulties to the work of the medical services in Mesopotamia at this time. There was no administrative medical officer appointed to headquarters of the force, and General Aylmer, on 12th December 1915, on his own authority appointed Lieut.-Colonel G. B. Irvine, I.M.S., as its D.D.M.S. Colonel Irvine had previously been officiating as A.D.M.S. of the 12th Division and, although acting as A.D.M.S. of the lines of communication at that time, his responsibilities had been more or less restricted to Amara.

On 16th December, Colonel Irvine informed Surg.-General Hathaway that General Aylmer had appointed him D.D.M.S. of the Tigris Corps. On 26th December a wire was received from G.H.Q. to the effect that no more medical units were in sight, but that the personnel of two sections of No. 1 Field Ambulance were being sent up to Amara, that two more sections would follow, and that these could be used on steamers

or added to the personnel of other ambulances and used for bringing down convoys of sick and wounded by river. All available dressings and one section of an Indian general hospital and half a section of a British general hospital were also being sent up. The two sections of No. 1 Field Ambulance, however, came without stretchers, dressings, or bearers ; the second two sections brought bearers but little else. The D.D.M.S. of the corps then started to improvise two field ambulances from the general hospital at Amara. Each was composed of a British section and an Indian section. The sections of the improvised field ambulances consisted of one medical officer, one medical subordinate and thirty sepoys to act as temporary bearers. The bearers were taken from battalions and were untrained. Forty stretchers for these sections were provided by the engineer field park between 27th and 29th December.

The First Attempt to Relieve Kut.

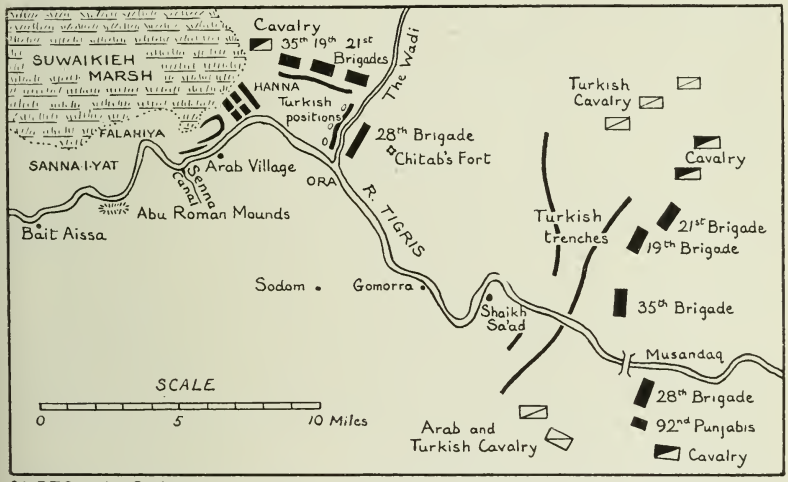
On the 31st December 1915, the Tigris Corps headquarters left Amara and went to Ali Gharbi. The Turks had entrenched themselves astride the river below Shaikh Saad. The Tigris Corps came into touch with the enemy on 6th January. The 7th Division, composed of the 19th, 21st and 35th Brigades, attacked the Turkish positions on the left bank and the 28th Brigade and the 92nd Punjabis attacked the position on the right bank. Officiating A.Ds.M.S. were appointed : Lieut.-Colonel Mawhinney, R.A.M.C., on the left bank, and Lieut.-Colonel L. Wood, R.A.M.C., on the right bank.

No. 20 Combined Field Ambulance (one section British, three sections Indian), No. 3 Combined Field Ambulance, (one British and one Indian section), No. 18 Cavalry Field Ambulance (one Indian section), No. 1 Field Ambulance (two sections), No. 5 Improvised Field Ambulance (one British and one Indian section) were with the columns. To corps troops were allotted No. 6 Improvised Field Ambulance. Two sections of No. 1 Field Ambulance were placed on board the " Julnar," which was to be used as a hospital ship.

The " Aerial " was to evacuate casualties from a dressing station on the river bank to the " Julnar," and each section of a field ambulance actually evacuating casualties from the front line was to be provided with ten army transport carts, in each of which two mattresses were placed. The commander of the Tigris Corps informed the army commander and Surg.-General Hathaway, the D.D.M.S. of the Expeditionary

Force, of the above arrangements and pointed out that although they were the best that could be made they were totally inadequate.

The battle of Shaikh Saad lasted through the 6th, 7th and 8th January 1916. By the morning of the 9th the Turks were observed to be retiring all along the line. Rain fell during the night 6/7th and the night 7/8th. The troops during this action had to attack over open ground and the casualties were severe. They amounted to a total of 4,007, including 133 officers. Of this number 90 British officers, 900 British



SKETCH MAP SHOWING THE POSITIONS OF TROOPS IN THE BATTLES OF SHAIKH SAAD, THE WADI AND OMM AL HANNA

other ranks and 2,500 Indian other ranks were admitted to the medical units during the 6th, 7th and 8th January. The wounded after the action of the 6th were put on board the "Julnar" and a paddle steamer; those of the 7th and 8th January were admitted into No. 20 Combined Field Ambulance and the improvised British sections. On 8th January another paddle steamer was placed at the disposal of the medical service and 41 British officers, 182 British other ranks and 313 Indian other ranks sick and wounded were placed on board. The majority of these were severe cases. On 9th January the D.D.M.S. of the Tigris Corps was informed that the relieving force was to occupy Shaikh Saad, and that the corps commander suggested moving 2,000 wounded on the left bank and 700 on the right forward to Shaikh Saad. This

method of evacuating cases to a forward position has already been referred to on pages 166, 198 and 202. It is contrary to all principles of training and demonstrates most clearly the want of consideration given by the G.O.C.'s staff to medical problems. The D.D.M.S. proposed that all the wounded should be gathered together on the left bank and that the force should leave sufficient troops to protect them until they were evacuated to the base. At 1 p.m., however, he was ordered to put on steamers and barges all men who could walk and to take them forward to Shaikh Saad and to leave the remainder until they could be evacuated by steamer. By 8 p.m. on January 7th the supply of dressings and blankets was completely exhausted. A few of the wounded were lucky and had been covered by one blanket. Very many were uncovered and became delirious during the night from fatigue, exposure and hunger. Two thousand wounded were transferred to the post hospital at Shaikh Saad and three medical officers with a few subordinate personnel were left to look after them. Rations were dumped both for British and Indians, but there was no supply and transport personnel to issue them. This had to be done by the medical officers, the senior of whom had to spend his time issuing rations instead of dressing wounded. The more severe cases were left at Musandaq along with two sections of an improvised field ambulance and two skeleton sections of No. 1 Field Ambulance to await steamers to evacuate them to the base. There were three medical officers and three subordinates to look after 1,200 wounded. These medical officers and subordinates could not feed all the sick or wounded, but the regiments which had depôts in the neighbourhood assisted in feeding their own wounded. Five hundred more wounded were transferred from the right bank to this post. The evacuation of the wounded was not completed until 24th January 1916. On 13th January Colonel Irvine had asked the senior medical officer at Amara to send the Meerut Stationary Hospital to Shaikh Saad. It arrived there five days later.

The Turkish force had retreated to a position on the Wadi river and the Tigris force followed it up and attacked this position on 13th January. On the night of the 12th/13th, Major-General Younghusband, with the 6th Cavalry Brigade and the 7th Division, was sent to try and outflank the enemy's left, while the 28th Brigade held the enemy in front, the 9th Brigade of the 3rd Division being in reserve.

No. 20 Combined Field Ambulance was ordered to accompany the 7th Division; two sections of No. 3 Combined Field Ambulance the 28th Brigade; and the Combined Cavalry Field Ambulance the Cavalry Brigade. The turning movement was not successful. The enemy retired from the Wadi river on the night of the 13th/14th January and took up another and stronger position about three miles in the rear at Hanna. Here they entrenched themselves, having their left on the Suwaikieh Lake and their right on the River Tigris. General Younghusband's troops pushed forward, and took up and consolidated a position facing the enemy. During these actions the troops had again to advance over an open country, an easy target for the enemy.

By this time the weather had broken. There were heavy rains and boisterous winds. The Wadi river became a roaring torrent and the whole surface of the ground was deep mud, making all movement most difficult.

The British losses at Wadi were 1,601 casualties, including 40 British officers. The wounded of the 28th Brigade had been collected near the river bank and the wounded of the 7th Division were collected about two miles from the river. From these positions they were gradually transported to the Wadi. The casualties were evacuated from Wadi by a paddle steamer which left at 9 p.m. on the 15th January with 7 British officers, 200 British other ranks and 609 Indian other ranks sick and wounded on board. On the 16th another paddle steamer left at 8.30 p.m. with 19 British officers, 31 British other ranks and 709 Indian other ranks sick and wounded. These boats evacuated all the wounded from the action of 13th January. The staff of each boat was one medical officer and two subordinates. The steamers had awnings, but the barges had only mat covers. There were no mattresses; all that could be given to the wounded were two blankets per man. Rations for three days were placed on board.

The operations at Hanna were rendered most difficult on account of the heavy rain and deep tenacious mud, but the advance was continued. On the 20th January the Turkish trenches were bombarded on both sides of the river. At 6 a.m. on the 21st, after a short bombardment, the 7th Division troops secured some of the Turkish trenches near the river. The Turks made a strong counter-attack and forced these troops out of the captured trenches. Another bombardment took place at 2 p.m. but without success and the British were withdrawn after dark to their original lines.

"Mud," Mesopotamia

An armistice for six hours was arranged the next day to bring in the killed and wounded.* The British casualties numbered 2,741, including seventy British officers. Unfortunately many irregularities occurred during the short truce, and marauding Arabs swarmed over the field of battle. A party of Seaforth Highlanders was captured and retained as prisoners of war until 1918. A senior officer of the Connaught Rangers was severely mauled by the Arabs, and many severely wounded were stripped of their clothes and left lying in the mud, bruised and naked. The temporary respite from fighting allowed some attention to be paid, not only to the sick and wounded, but to the troops also, a very important point, as their moral had been lowered and, from the point of view of the medical authorities at all events, the enforced interval, by allowing the fatigued troops a short rest, saved many from being evacuated down the line for neurasthenia.

The field ambulances allotted to the 7th Division during the attack on the Hanna position were three sections of No. 20 Combined Field Ambulance, one section of No. 18 Cavalry Field Ambulance, one section of No. 128 Indian Field Ambulance, one section of No. 19 British Field Ambulance, and a detachment from No. 111 Indian Field Ambulance. The last three units were portions of the field ambulances of the 7th and 3rd Divisions which had arrived at Wadi on the 19th January.

The evacuation of sick and wounded from the battlefield was very unsatisfactory as there was little or no ambulance transport and the bearers were insufficient in number to cope with the casualties. The action was fought in stormy weather and the heavy rains turned the soil into a sea of mud. Army transport carts laden with wounded sank to the axles and many of the wounded had to lie out all night. When they were collected the tentage accommodation was insufficient and the personnel of the tent divisions were unable to feed or dress them properly. These wounded were covered with mud, the majority had no overcoats, and after lying out for some time they were in a very exhausted condition, many dying from exposure. It is impossible to imagine worse conditions, and never in the whole experience of the campaign had such conditions been prevalent or the sufferings of the wounded greater.

The wounded were placed on board the "Julnar" and a paddle steamer as quickly as possible and all officers and men

* There was some doubt who arranged this armistice, but it is now generally accepted that General Aylmer asked the Turkish commander for it. In many ways it was advantageous to the British force and many severely wounded were collected.

who could walk took shelter on any steamer they could find. By the evening of the 21st, 1,500 casualties had been collected and after dark another steamer, the "Salimi," went to the creek north-west of the Wadi and during the evening evacuated six British officers and 450 British other ranks. The evacuation from the field of battle was completed between 1 a.m. and 2 a.m. and 120 wounded were brought in from a position near the trenches by the motor boat "Aerial" and other small craft lent by the Navy. The "Salimi" evacuated cases to Amara on the 22nd; one medical officer and one subordinate were placed on board along with one British nursing orderly, two sweepers and one Indian ward orderly. At 2 p.m. on the 22nd January a paddle steamer was sent down with 6 British officers, 186 British other ranks, 12 Indian officers and 726 other ranks—a total of 930. Many of these cases were slightly wounded. The medical personnel consisted of an improvised section of the field ambulance. Rations were put on board, but in the absence of a proper number of cooks they were not used. The remainder of the wounded were evacuated on three other paddle steamers. There were no beds on these steamers, the boats were overcrowded, the nursing and cooking personnel were few. It was simply a case of getting all downstream as quickly as possible. The total number of wounded cleared and evacuated was thirty British officers and 1,876 British and Indian rank and file.

After the battle of Hanna the Tigris Corps remained stationed at Ora camp where the 3rd and 7th Divisions were gradually brought up to strength, and were joined by their own medical units.

The Medical Situation on the Lines of Communication.

The medical units on the lines of communication which had to treat the casualties from the Tigris Corps during its advance to Hanna and also from the battle of Ctesiphon were one and a half sections of a British general hospital, one section of an Indian general hospital, and the Bengal Stationary Hospital at Amara, and the remaining sections of the British and Indian general hospitals at Basra.

Although the original accommodation at Basra of 250 beds for British and 600 beds for Indian troops had been raised to 600 beds for British and 1,000 for Indians when the 12th Division was formed, it had not been expanded before the battle of Ctesiphon or for the relieving force that was operating against Kut.

After the battle of Ctesiphon two hospital ships which had been ordered from India helped to ease the congestion at Basra, which had been increased by the presence of 1,300 prisoners of war taken at Ctesiphon. All these prisoners of war were inspected and those found unfit to travel were transferred to the American Mission Hospital for further treatment. The s.s. "Ellenga" was furnished with the necessary medical and surgical equipment, and a medical staff consisting of a medical officer and an assistant surgeon was placed on board. The ship sailed for India on 20th December with about 1,200 prisoners on board.

After the cases from Ctesiphon had been evacuated the general

Hospital at Basra under water owing to floods.

hospitals obtained a short respite before a convoy arrived on 24th December. This increased the numbers in the Indian general hospital to 1,800. The same convoy brought 130 British sick and wounded and after these had been accommodated there were only eighty-nine empty beds in the British hospital. To make matters worse each hospital had been ordered to prepare a section to proceed to Amara. The order concerning the British section contained the reservation that sufficient personnel for two complete sections was to remain with the unit in Basra and consequently no medical officers or assistant surgeons were available for duty with the detached section. So great was the shortage of all personnel that even dhobies* and tailors were employed on ward duties. It was pointed out to the D.D.M.S. of the force that there was great shortage of personnel and that all

* Washermen.

the equipment of the hospital was in use. As a result of this representation only seventy-five beds were equipped for the section proceeding up river. By evacuating 194 cases on the "Varela" to India the British general hospital was able to send off the detachment to Amara on 28th December. Arrangements were also made for the expansion of the British and Indian general hospitals.

In the meantime arrangements dealing with the arrival of the new divisions at Basra were proceeded with as rapidly as possible. During December about 30,000 troops arrived. Many of the units merely passed through Basra spending a night or two there. Camping accommodation was enlarged at Makina, new camps were formed at Magil and at the corner by Ashar Creek a large customs shed and neighbouring ground were made ready for the reception of 800 men. The opening of these new camps entailed considerable sanitary arrangements.

At the beginning of January 1916 the medical units of the Indian contingents from France began to arrive. On the 2nd the Secunderabad Indian General Hospital disembarked. This was a complete Indian general hospital of 500 beds which was at once attached to the remains of No. 9 Indian General Hospital and became known as No. 10 Indian General Hospital. After these reinforcements arrived orders were issued for the Indian General Hospital to take over the convalescent depôt at Makina which was at that time staffed by No. 19 Combined Clearing Hospital. This combined clearing hospital, on relief, proceeded upstream on the 7th January. Next to arrive was the personnel of Nos. 129 and 130 Indian Field Ambulances and No. 21 Combined Field Ambulance. The equipment and wagons of the first-named unit were expected in another ship and pending its arrival the personnel went into camp at Makina. No. 21 Combined Field Ambulance was encamped at Magil, then moved to the convalescent depôt camp at Makina and three days later marched with an echelon column to Amara. Section "A" of the Rawal Pindi British General Hospital disembarked on the 6th January and its personnel was all attached for duty at No. 3 British General Hospital. It was a 200-bedded unit, completely equipped, and accompanied by six nursing sisters. There were now fifteen members of Queen Alexandra's Military Nursing Service for India in Mesopotamia. With the Rawal Pindi Hospital came a part of the Meerut Stationary Hospital. It went into camp at Makina ; the rest of the unit arrived a fortnight later, but the arrival of these hospitals did not increase the accommodation at Basra for sick and wounded. Their

equipment and personnel, which were much needed, were fully utilized, but the pressing need at the time was beds. These units were powerless to help in this way as there was neither a building nor ground for pitching tents available. Their stores could not be placed under cover and suffered in consequence as the rains had commenced and mud was everywhere.

With the development of Magil, arrangements had to be made for dealing with the sick of that camp. This was undertaken by a section of No. 9 Indian General Hospital. The Meerut Casualty Clearing Station arrived on the 11th, and was encamped at Makina along with the first portion of the Meerut Stationary Hospital, No. 112 Indian Field Ambulance, No. 128 Indian Field Ambulance, Nos. 19 and 20 British Field Ambulances, No. 4 Sanitary Section, and No. 3 Advanced Depôt Medical Stores, all awaiting transport up river. The first to leave was the Meerut Stationary Hospital, followed by certain personnel of No. 19 British Field Ambulance and No. 128 Indian Field Ambulance.

At this time a large convoy of sick and wounded from the battle of Shaikh Saad had arrived. More were expected and the general situation became serious. Sick and wounded were coming down the river, while fresh troops were arriving and struggling to make their way up river. The two streams met in Basra and confusion prevailed. Portions of units arrived in one ship, the remainder in another and the equipment in yet a third or not at all. Transhipping at the bar added to the confusion. Officers and men wandered about in the mud trying to find their way to new camps at Makina and Magil from vague directions given them by overworked officers, and arrived at their destination to find that nobody at the camp knew anything about them. Drinking water was scarce, feeding arrangements were inadequate, and sanitation generally was at its lowest ebb. One of the chief reasons for all this was the scarcity of non-combatant labour. It practically did not exist and nothing could be done without it. Apart from labour required on roads, camps and hutments and for sanitary improvements, there was very little for unloading stores and equipment. The shortage of transport was another cause of trouble. Boats which arrived with sick and wounded were ordered to return to the front next day, giving little time for cleaning or disinfecting or provisioning the vessel. The chief difficulty, however, of the medical service was to provide accommodation for the sick and wounded coming downstream. On the 13th January the customs shed

was emptied of troops and the Meerut Casualty Clearing Station took it over as an additional base hospital. It was opened for 100 cases two days later. At the British general hospital as many tents as could be pitched on the low-lying piece of ground to the north were erected. No other site was available and the heavy rains and rising river soon threatened to make this untenable. Between the 15th and 20th January seven convoys of sick and wounded arrived and soon the British general hospital was in difficulties. Fortunately, on the 17th January the hospital ship "Varela" took cases direct from a river boat, thus allowing the British general hospital to have 110 empty beds. Two hundred and fifty-five patients were expected the same afternoon and 200 more had left Amara. The former convoy arrived in the "Mosul" late at night and was taken off, filling the hospital to overflowing. Halls, verandahs, office, dispensary, X-ray room and laboratory were all occupied. The next morning the captured enemy ship "Karadeniz," which had been made into an improvised hospital, was utilized and 260 cases were transferred there. The relief was but temporary, however, as on the same evening two more convoys arrived and again every corner was filled.

At the Indian general hospital the pressure had not been so greatly felt. Few Indians came down with the first convoy, and moreover the Indian patient lends himself to an easier method of treatment, and does not require such refinements in feeding implements as the British.

The accommodation at the Makina Convalescent Depôt was increased from 300 on the 12th January to 740 on the 17th, and in addition the customs shed accommodation had been enlarged to 700. The arrival of two hospital ships, the "Cecilia" and "Takada," on the 19th relieved the congestion. The British general hospital was called on to supplement the staff of the "Takada" to deal with the extra work on board. It may be noted that Surg.-General Macneece, D.M.S., India, who had been paying a visit of inspection to Mesopotamia with his staff officer, was also a passenger returning to India on this boat. His visit at such a time must have afforded him full opportunities for a most complete grasp of the medical needs, even although he did not proceed beyond Basra. Furthermore, it was to Surg.-General Macneece that Major Carter, I.M.S., O.C. H.S. "Varela," on 14th December 1915, sent a report describing the condition of the wounded on their arrival at Basra. It is therefore difficult to understand his statement which was published in the Indian papers that the medical arrangements were satisfactory.

On the 20th a small convoy of 45 cases arrived bringing the number of patients who had been dealt with in Basra during the six days up to 1,600. By the 21st January accommodation for sick and wounded at Basra base had considerably increased. The " Karadeniz " was ready to receive 500 British cases and the customs sheds 700 Indians ; a section of No. 9 Indian General Hospital at Magil could take 200 Indian cases and the second half of the Meerut Stationary Hospital had arrived and was to open in the customs sheds. Section " B " of the Rawal Pindi British General Hospital had also arrived and arrangements were at once made for it to proceed to Amara.

In view of the fact that the accommodation in Basra was still limited for the wounded expected, it was decided to transfer all the light cases to India on a hired transport. The transport " Khosru " was acquired and a staff placed on board from the Indian general hospital. This boat, however, only acted as a ferry boat to the H.S. " Loyalty," which had arrived at the bar on the 22nd January. The " Loyalty " was another " voluntary hospital ship " placed at the disposal of the Indian Government by certain Indian princes. The transport " Teesta " was also found to be highly suitable in every way for Indian patients. The British general hospital supplied the staff and this boat sailed for India with 800 Indian patients on board.

Between the 26th and 28th of January five river boats arrived with sick and wounded on board, but the experience gained during the previous days had served a useful purpose, and no stone had been left unturned to make adequate provision for their reception. The accommodation for British cases had been raised to 1,700, distributed as follows : 600 in the British general hospital, 600 in the " Karadeniz," and 500 at the Ashar Barracks. The last named was staffed by a section of the Meerut Casualty Clearing Station. By evacuating 150 cases to the " Karadeniz " and 100 to the convalescent depôt the first convoy of 260 cases arriving on 26th January was easily dealt with, although that night there were 880 cases in hospital. Fortunately the H.S. " Guildford Castle " had arrived at the bar on 26th January, and the transport " Khosru " was called into requisition as a ferry boat a second time. Its personnel and equipment were provided by the British general hospital, and cases were evacuated from it to the " Guildford Castle."

The shortage of equipment and personnel caused by the expansions of the hospitals and by providing convoys was a

serious matter at this time, but the object had been attained, and when four convoys appeared on the night of the 27th January there was room for all British casualties without undue overcrowding. The Indian casualties were provided for more easily, and the requirements of the situation were met by the apparently unlimited capacity of the Makina Camp and by enlarging the Indian general hospital. The search for hired transports for the evacuation of light cases had not been productive of much result. Only the "Teesta" had been dispatched and another was still needed. The "Ellora" was considered suitable and sailed on the 30th with both British and Indian patients. One more convoy of sick and wounded arrived from Amara on the 31st, and, with the exception of the serious cases detained at Amara, provision had now been made for all the casualties which had occurred up to and including the battle of Hanna.

The salient features in the medical arrangements for the battle of Ctesiphon and the operations for the relief of Kut, undertaken by the Tigris Corps, were the lack of transport and of medical units, and a proper scheme for the evacuation of casualties. There are no records showing that the D.D.M.S. of the Expeditionary Force instituted any comprehensive scheme of medical arrangements for the operations conducted by the Tigris Corps. His lack of co-operation and initiative, and the absence of a forcible policy are outstanding points in the history of the campaign. The river steamers were not equipped for the transport of sick and wounded men, and their use for such a purpose could only be attended with marked suffering, and rarely have wounded arrived at base hospitals in a worse condition. When the operations did take place, the G.O.C. of the Tigris Corps took action knowing full well that his medical service was not sufficient. When the Tigris Corps was formed at Amara the corps commander appointed his own D.D.M.S., Colonel Irvine, as G.H.Q. would not assist by appointing an administrative medical officer. Colonel Irvine had no staff, he was absolutely single-handed, his units were depleted and deficient in number and some of them were improvised units hastily organized. There was a great shortage of surgical dressings, drugs, comforts, stretchers, clothing, tentage, transport and firewood. These could not be obtained at short notice. The D.D.M.S. of the Tigris Corps asked for them to be sent up, but all the transport vessels had to be allotted for carrying troops and rations. With the material at Colonel Irvine's disposal and the untrained staff in charge of formations, it was impossible

for him to do more than he did. It was purely a case of the competent military authority deciding to advance with the fresh troops which had arrived at Basra, and that the wounded had to be sacrificed. These troops had arrived without their medical units. It was believed that when the 3rd and 7th Divisions left France they would concentrate either in Egypt or Mesopotamia before being put into action, but there was no time for this. When the medical units were embarked at Marseilles they were divided up and placed in different transports. On arriving in Mesopotamia they were delayed at Basra and other places along the line ; this was due to the lack of transport and the extraordinarily bad weather prevailing at the time. The idea of these divisions going into action without their medical organization was strongly represented to the general officers commanding the divisions by their respective A.Ds.M.S. When the 3rd Division headquarters reached Amara the A.D.M.S. of the division was ordered by the D.D.M.S. of the Expeditionary Force to improvise medical units at Amara—an order which could not be carried out as there was no medical personnel available to form a field medical unit. The dislocation of the medical units of the 3rd and 7th Divisions was no doubt partly to blame for the breakdown in the medical arrangements, and it demonstrates a lesson that should never be forgotten.

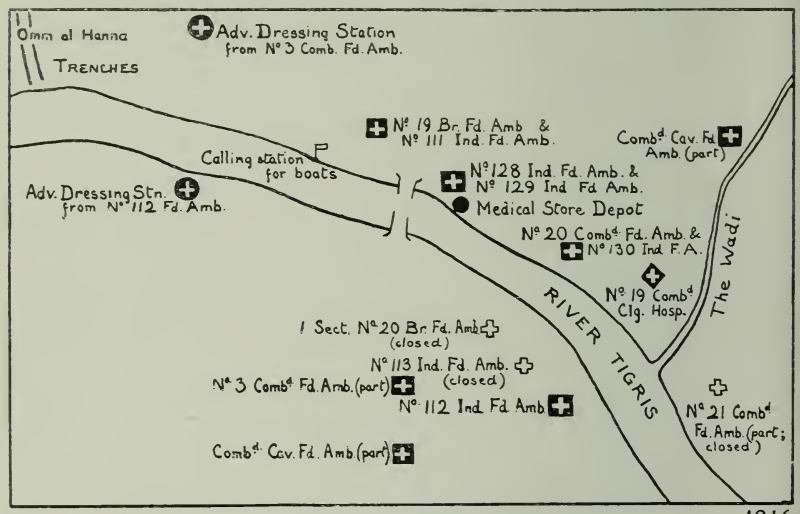
Subsequent Attempts to Relieve Kut.

During January and February 1916 the field ambulances of the 3rd and 7th Divisions,* and a new unit, No. 21 Combined Field Ambulance, were gradually concentrated at Ora Camp. The total ambulance transport with No. 21 Combined Field Ambulance consisted of five mule-drawn ambulance tongas, and No. 19 British Field Ambulance had six heavy ambulance wagons.

On 6th March, Colonel Irvine, D.D.M.S. of the Tigris Corps, was allotted a staff. Major A. W. Cook Young, I.M.S., was appointed D.A.D.M.S. (Sanitation), and Major A. W. M. Harvey, I.M.S., D.A.D.M.S. of the Tigris Corps. The A.D.M.S. and D.A.D.M.S. of the 7th Division had arrived on 11th January 1916, and were in time for the battles of Wadi and Hanna, and the A.D.M.S. and D.A.D.M.S. of the 3rd Division had arrived on 14th January and were present at the battle of Hanna.

* Each of these divisions had two British and three Indian field ambulances attached to it. The field ambulances were composed of four sections, each equipped for twenty-five cases.

The 7th Division took over the area on the left bank of the river and after the heavy fighting of January spent February in holding the enemy and in reorganizing. With it were Nos. 19 and 20 British Field Ambulances and Nos. 128, 129 and 130 Indian Field Ambulances. Field ambulances in action opened and organized advanced dressing stations and collecting posts. Casualties were collected from the trenches and evacuated by hand carriage to these posts, and at the advanced dressing station situated near the river were placed on board the "Aerial" which conveyed them to the field ambulances. The 3rd Division was stationed on the right bank of the river


Omm al Hanna
Adv. Dressing Station from N° 3 Comb. Fd. Amb.
TRENCHES
N° 19 Br. Fd. Amb & N° 111 Ind. Fd. Amb.
Comb.d Cav. Fd Amb. (part)
Calling station for boats
N°128 Ind. Fd. Amb. & N° 129 Ind Fd Amb.
Adv. Dressing Stn. from N° 112 Fd. Amb.
Medical Store Depot
N° 20 Comb.d Fd. Amb. & N° 130 Ind F.A.
The Wadi
N° 19 Comb.d Clg. Hosp.
RIVER TIGRIS
1 Sect. N° 20 Br. Fd. Amb (closed)
N° 113 Ind. Fd. Amb. (closed)
N° 3 Comb.d Fd. Amb. (part)
N° 112 Ind. Fd. Amb
N° 21 Comb.d Fd. Amb. (part; closed)
Comb.d Cav. Fd. Amb (part)

SKETCH MAP SHOWING POSITIONS OF MEDICAL UNITS AT ORA, FEB. 1916

and with it were Nos. 7 and 8 British Field Ambulances and Nos. 111, 112 and 113 Indian Field Ambulances.

During the earlier part of the month the extra dressings and medical stores that the field ambulances of both the 3rd and 7th Divisions had brought with them from France were of very great value, as they enabled units to replenish their stores until the arrival of an advanced depôt of medical stores at Ora. There was a considerable amount of sickness, due chiefly to the cold and wet, the mud and grit in the drinking water and the poor food, the latter being very often insufficiently cooked owing to lack of fuel. The chief difficulty of the medical service was the evacuation down river of sick convoys.

The sanitary conditions at Ora Camp were very bad, but they were gradually improved, although the ground remained

more or less foul. The wet precluded any chance of burning litter or night soil and, as the camp areas were enlarged with the arrival of fresh troops, camps were brought closer together and at times tents were actually pitched upon sites of former latrine areas. When notice boards were put up by a unit to mark those sites, they rarely, if ever, remained one night before being stolen for fuel.

On 21st February the 3rd Division moved into the Senna position on the right bank of the river and on the 22nd, at dawn, the 9th Brigade, with the 8th Brigade in reserve, advanced and took over without difficulty a ridge on the right bank of the Tigris known as Mason's Mound, the 7th Brigade remaining at Senna until relieved by the 35th Brigade. Combined bearer divisions proceeded with each brigade from Ora. They

Collecting wounded from aid posts, Mesopotamia, March 1916.

Advanced dressing station on the Tigris, March 1916.

were practically the bearer personnel of three sections of an Indian field ambulance and one section of a British field ambulance with light equipment but without tents. They opened dressing stations close behind the front line. Sick and wounded were collected at all hours and those not likely to recover within a few days were evacuated daily on transport carts to Senna, where the remainder of the personnel of the 3rd Division field ambulances had formed what was practically a divisional dressing station. From Senna sick convoys proceeded daily to Ora.

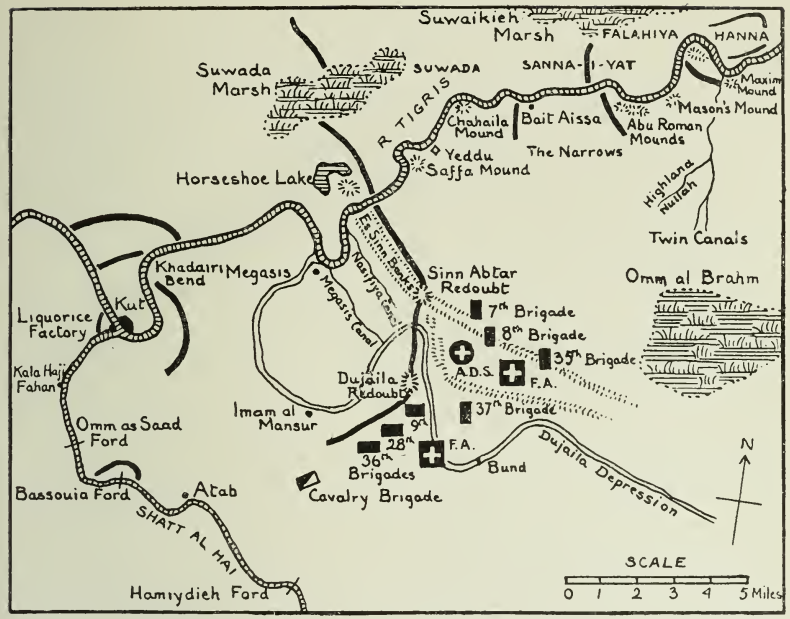
The situation at the end of February 1916 was briefly as follows. On the left bank the enemy having been reinforced still held the Hanna position in force. Further in rear were other defensive lines at Falahiya, Sanna-i-Yat, Nakhailat and along the northern part of the Es Sinn position. These

positions were protected on both flanks by the Tigris and the Suwaikieh marsh respectively. On the right bank the Es Sinn position constituted the Turkish main line of defence with an advanced position near Bait Aissa. The right flank of the Es Sinn position rested on the Dujaila Redoubt which lay some five miles south of the river and fourteen miles south-west of the British lines on the right bank. It was decided to attack the Turkish right flank and Dujaila Redoubt.

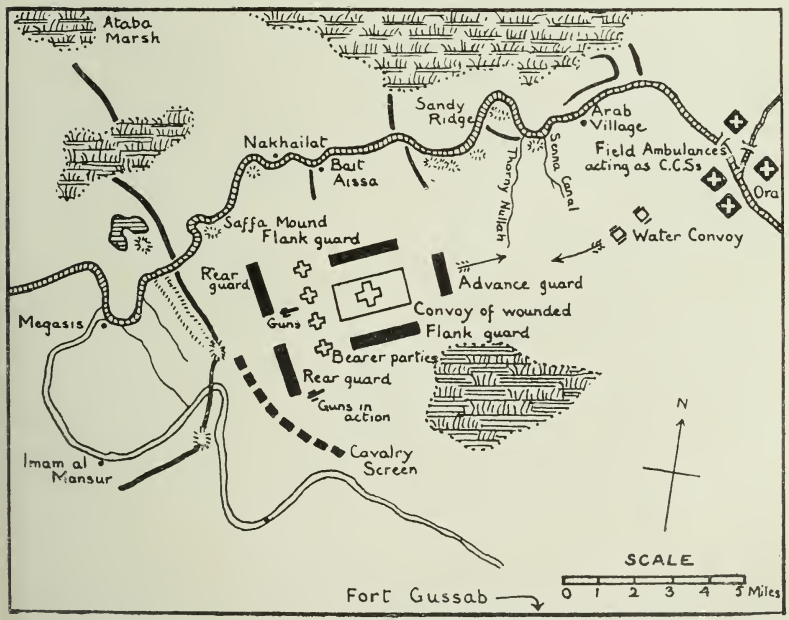
General Younghusband, with part of the 7th Division assisted by some naval gun boats, was to hold the enemy on the left bank; the remaining troops of the Tigris Corps were formed into two columns under Major-General Kemball and Major-General Keary respectively; an infantry brigade and the cavalry brigade were under the orders of the corps commander. Colonel A. E. Tate, A.M.S., was appointed D.D.M.S. of this mixed force. The A.D.M.S. was Colonel Grayfoot, I.M.S., and the D.A.D.M.S. Brevet-Colonel J. M. Sloan, R.A.M.C. Kemball's column, covered on the outer flank by the Cavalry Brigade, was to make a turning movement and attack the Dujaila Redoubt from the south supported by the remainder of the force operating from a position to the east of the Redoubt. The medical units for these columns were supplied by portions of field ambulances drawn from the different divisions and the unattached field ambulances. To form casualty clearing hospitals for the sick and wounded the field ambulances of the 3rd and 7th Divisions were ordered by the D.D.M.S. of the Tigris Corps to detach portions of their units and send them back to Ora. No definite convoys were formed for the evacuation to Ora of sick and wounded from the attacking force.

Evacuation of wounded from an advanced dressing station on Army transport carts, Tigris, March 1916.

The force concentrated on 7th March after dark on a site marked out with mounds and shade lamps. After a slow and tiring march with checks every few minutes the force arrived



SKETCH MAP SHOWING THE POSITIONS OF TROOPS AND MEDICAL UNITS DURING THE ATTACK ON THE DUJAILA REDOUBT, 8th MARCH 1916



DIAGRAMMATIC SKETCH ILLUSTRATING THE METHOD OF PROTECTING THE SICK AND WOUNDED CONVOY DURING THE RETIREMENT FROM DUJAILA

at their positions shortly after dawn.* The attack was delayed and when it commenced it was no surprise for the Turks, who, warned by the artillery preparation, had manned the Dujaila Redoubt and their defences in force. The British attack came to a standstill about noon. Another attack was made late in the afternoon and obtained a footing in the redoubt, but the enemy, aided by the setting sun and a cloud of smoke and dust, made strong counter-attacks and drove the force out of it.

The bearer divisions selected advanced dressing stations and the field ambulances opened up tent sub-divisions. All had to work at high pressure. The number of casualties collected totalled 2,500. On the morning of the 10th it was decided that the force should retire to Ora. Corps headquarters returned to Ora, and the G.O.C., before completing his plans for the withdrawal of the force, considered suggestions put before him by Colonel J. M. Sloan, R.A.M.C., for the disposal of the 2,500 wounded, with the result that all available transport carts were placed at the disposal of the medical service. The transport carts had previously brought up supplies which were dumped and destroyed. At 10 a.m. the whole force moved back, the wounded being allotted the centre position of the column. All slightly wounded cases had to walk ; only severe cases were carried in carts and in the few ambulance wagons belonging to No. 19 British Field Ambulance of the 7th Division. Some of the carts had been padded with hay and blankets, and in others rough head coverings were erected, but the majority had neither cover nor mattress. The journey on foot or in a jolting cart over a distance of fourteen miles was a horrible trial to the wounded. There was little or no water, and splints became disarranged by the jolting. The medical officers and personnel had been on foot for two nights and one day. They were exhausted and could do little for the sick and wounded during the retreat. Bearer sub-divisions of the field ambulances accompanied the rearguard and during the retirement did excellent work. No medical transport was available for the wounded of the rearguard, and they had to be carried all the way on stretchers or put on gun carriages and limbers. Fortunately, although the enemy did attack, he was kept at a distance and dispersed by artillery fire.

* The formation of the troops for this night march and the march itself were considered to be the most brilliant operation the force had yet performed. The medical units taking part had been well instructed regarding the route and formation on the march. They carried out their instructions, found their place and kept in touch with the other units, a performance well worthy of record in the history of the medical services.

The first wounded reached Ora Camp about 4 p.m., and continued coming in all night. Half the medical units forming hospitals at Ora were situated on the left bank. There was only one pontoon bridge constructed of native craft across the river, and great delay was experienced in getting wounded over this bridge, several of them remaining on the right bank for many hours. Some arrangement had been made for evacuating the wounded from Ora. Convoy parties had been detailed for the river boats, and these boats were cleaned before the wounded were placed on board. A certain number of camp beds for the serious cases was available. There was a sufficiency of rations, medical comforts and dressings, but, nevertheless, the conditions could not be described as reaching the standard of comfort which might have been expected after seventeen months of war.

During these operations, the largest yet undertaken in Mesopotamia, the conditions for the sick and wounded had improved. This was due to a large extent to the number of medical units which had come from France well equipped with extra dressings and comforts, and with a broad experience in the methods of dealing with large numbers of casualties. The medical arrangements made, however, were not ideal, and main principles of the medical service as laid down in Field Service Regulations were not adhered to. The absence of casualty clearing stations compelled the D.D.M.S. of the corps to improvise these units. Instead of detailing a certain number of complete field ambulances to act as casualty clearing stations, he adopted the method of detailing small detachments from different units to form improvised casualty clearing stations. Complete field ambulances would have been better able to form an organized hospital; but the method adopted led to an improvised unit difficult to handle and impossible to organize properly. Furthermore, the erroneous principle initiated at the battle of Sahil and adhered to at the first battle of Kut-al-Amara and Ctesiphon, that sick and wounded should be carried forward was still maintained, as even in these operations instructions were issued by the Corps Headquarters that wounded were to be collected and taken forward to the Dujaila Redoubt, a place occupied by the enemy, and no provision had been made in the event of the position not being captured. The position was not captured and all the wounded, about 2,500, had to be transported to the river. In order to do this all the supply carts had to be requisitioned and their loads scrapped or abandoned, but even then the

transport was inadequate, and the army bearer corps, exhausted as the men were by continuous marching and by taking wounded from the battlefield to the field ambulances, had to carry a certain number of cases a distance of fourteen miles by hand. The lack of modern ambulance transport necessitated the placing of serious cases, such as head wounds, thoracic wounds, abdominal wounds and men with fractured thighs, on rough, springless transport vehicles. The sufferings experienced by the wounded must have been extreme and are beyond description. The weather at the time was very warm and although arrangements had been made for a small supply of drinking water, this was totally inadequate, and the lack of water added not only to the misery of the wounded, but to the discomfort of the fighting troops.

On 10th March the 3rd Division on the right bank again took up the Senna position, and an advance took place on the 11th. After some stiff fighting the division finally occupied a line known as the Thorny Nullah line. The casualties in this fighting numbered 300. Two bearer sub-divisions were allotted to each brigade, and the casualties were evacuated from dressing stations on transport carts to the tent subdivisions opened at Ora.

On March 16th the enemy cut the river embankment and flooded the country in front of his positions and a considerable portion of the British trenches had to be vacated. All ranks were busy day and night making dams for the protection ot Ora and Senna Camps, which were seriously threatened owing to the height of the river. Rations were scarce and there was little fuel; fodder for the animals was also deficient and fatigue parties were detailed to cut scrub and graze animals.

During this month the 13th Division, a British division that had come lately to Mesopotamia, moved up to Ora with Nos. 39, 40 and 41 Field Ambulances, and 3rd Divisional headquarters and details moved out to Senna to make room for them. Colonel H. M. Morton, R.A.M.C., was A.D.M.S., and Bt.-Lieut.-Colonel D. S. Skelton, R.A.M.C., D.A.D.M.S. of this new division. A period of trench warfare had now set in and the Tigris force was being reorganized for a further attempt to relieve Kut. By April 1916 the force consisted of the Tigris Corps headquarters, the 6th Cavalry Brigade, the 3rd, 7th and 13th Divisions, and the 35th, 36th and 37th Brigades; the medical units with the different formations were :—

6th Cavalry Brigade : Nos. 119 and 131 Combined Cavalry Field Ambulances.

3rd (Lahore) Division : Nos. 7 and 8 British Field Ambulances ; Nos. 111, 112, and 113 Indian Field Ambulances.

7th (Meerut) Division : Nos. 19 and 20 British Field Ambulances ; Nos. 128, 129 and 130 Indian Field Ambulances.

13th British Division : Nos. 39, 40 and 41 British Field Ambulances.

In addition, there were the following extra-divisional medical units : Nos. 3, 20, 21, 22 and 24 Combined Field Ambulances, and Nos. 108 and 135 Indian Field Ambulances ; No. 16 British Casualty Clearing Station, and No. 19 Combined Clearing Hospital of one British and three Indian sections. The extra-divisional field ambulances had each one British and three Indian sections, with the exception of No. 3, which had only one British and one Indian section, and Nos. 108 and 135 Indian Field Ambulances, which were for Indians only, with two sections in the former and four in the latter.

The only wheeled ambulance transport which had arrived at the front were six heavy ambulance wagons, eight ambulance tongas, four motor ambulance cars, and thirty-six light ambulance wagons, which had come with the medical units of the 13th Division. On the 1st April, No. 5 Advanced Depôt of Medical Stores arrived.

At the beginning of April the 13th Division relieved the 7th Division on the left bank. On the 5th of the month this division attacked the Hanna position, while on the right bank the 8th Infantry Brigade of the 3rd Division attacked and captured the Turkish position at Abu Roman. While these actions were in progress the river rose rapidly and it was evident that a fresh flood was coming down. On the evening of the 5th April, the 13th Division assaulted and carried a series of deep Turkish trenches at the Falahiya position. The division suffered some 1,300 casualties during the day. The 7th Division which had been in support of the 13th Division now moved forward and took up a position about two miles east of the Sanna-i-Yat position in order to attack the northern portion of this position. An attack over 2,300 yards took place and the advance continued to within 700 yards of the Turkish trenches. It was checked and the division had to fall back and dig themselves in 1,000 yards from the enemy. The

flood was increasing and the position was critical. Suwaikieh marsh was encroaching on the ground occupied by the 7th Division and the inundations on the right bank threatened to isolate the 3rd Division. At 4.20 a.m. on 9th April the 13th Division advanced to the assault on Sanna-i-Yat. When the attack was within 300 yards of the enemy's front line the troops of the 13th Division were discovered by the Turks and had to fall back. They dug themselves in about 500 yards from the enemy. The 7th Division again took over from the 13th and pushed forward the trench works in front of Sanna-i-Yat as far as possible. On 12th April the 13th Division was held in reserve at Falahiya Bridge; the 3rd Division on the right bank, advancing across water-logged country, drove in the enemy's pickets east of Bait Aissa and occupied his outpost line, consolidating their position during the night. On 15th and 16th April some more of the enemy's advanced trenches were captured and counter-attacks were repulsed. Preparations were then made for an attack on the Bait Aissa position on the morning of the 17th. Under cover of a bombardment the 7th and 9th Infantry Brigades attacked the Bait Aissa position and captured it. The 13th Division was to move up after dark to relieve the 3rd Division, which was to concentrate on the left rear of the 13th preparatory to further operations. About 7 p.m., however, the enemy forced the 9th Infantry Brigade to retire, thus exposing the left of the 7th Infantry Brigade, which was also partly forced back. The 8th Infantry Brigade, whose right was exposed by the retirement of the 9th Infantry Brigade, was holding the greater part of its ground on the left of the line. The reinforcements from the 13th Division were delayed owing to the darkness and boggy ground. The enemy continued to attack, but was driven off. During the succeeding days some progress was made, but the boggy nature of the ground made movements difficult and the troops were soon worn out.

The 7th Division on the left bank had been consolidating and pushing forward its position, but owing to the inundations from the flood the final attack had to be made on a front of only 300 yards. This attack was carried out on the 22nd April. The leading troops carried the enemy's first and second lines, but only a few men reached the third line, and large Turkish reinforcements came up and drove them back. By 8.40 p.m. the 7th Division were back in their own trenches, having suffered 1,300 casualties. By mutual consent parties went out under the Red Crescent and Red Cross flags to

collect their respective wounded. This was a fortunate arrangement because many of the seriously wounded of the 7th Division ran a grave risk of drowning as they lay in pools and shallow water. The Seaforth Highlanders alone recovered nearly 300 wounded belonging to their regiment. These casualties would have been either drowned or taken prisoner.

The medical arrangements for the operations carried out by the 7th and 13th Divisions during April on the left bank against the Hanna, Falahiya and Sanna-i-Yat positions were comparatively simple, as the military operations consisted principally of attacks on entrenched positions. Such attacks and the medical arrangements necessary for them had been experienced both by the 7th Division in France and the 13th Division in Gallipoli. The general principle on which they worked was for regimental medical officers to establish regimental aid posts in dugouts somewhere in the position of the fourth line. The field ambulances opened collecting stations on both flanks and further back an advanced dressing station near the river bank. The casualties, numbering approximately 4,000, were brought by the regimental stretcher bearers to regimental aid posts and further evacuated by the field ambulance bearers to the collecting posts. Here a relief took place and patients were carried on stretchers or placed on wheeled stretchers or transport carts and evacuated to the advanced dressing station, from whence they were evacuated to the tent divisions of the field ambulances stationed at Ora. During this latter stage they were conveyed on boats, launches, transport carts, ambulance wagons and motor cars. The " Aerial," capable of carrying twenty cases, was of the greatest service in evacuating certain types of cases. The motor ambulance cars were available principally for the evacuation of casualties from the Sanna-i-Yat battle.

On the right bank during the operations against the Bait Aissa position by the 3rd and 13th Divisions there was more movement of the troops, and consequently there was more change in the position of the medical units. Detachments from five different field ambulances sent back by the D.D.M.S. of the corps formed two improvised casualty clearing stations, one for British and one for Indian casualties of the 3rd Division. For the operations at the beginning of April tent divisions were opened in Thorny Nullah. The cases were evacuated principally on transport carts, general service wagons and mahelas from these tent divisions to the improvised casualty clearing stations at Ora.

After the Hanna and Falahiya positions on the left bank had been taken and the enemy had retired to the Sanna-i-Yat position, the 8th and 37th Brigades were cut off by the floods. A dressing station was then formed for these brigades, consisting of personnel and equipment that were drawn from No. 8 British Field Ambulance and No. 112 Indian Field Ambulance. It was situated at a point south of the Abu Roman Mounds and from this dressing station sick and wounded were evacuated by river to Ora on empty supply mahelas.

On 11th April several tent sub-divisions, which had opened in Thorny Nullah, were moved down to the river at Maxim Mound, while the remainder were moved to Sandy Ridge to form a casualty clearing station. During the preliminary advance against the Bait Aissa position there were 300 casualties, and those able to walk were guided over a path through the flood area direct to the units at Sandy Ridge ; those unable to walk were evacuated by mahela. As the advance continued medical detachments were moved forward.

During the heavy fighting throughout the night of the 17th and 18th April, the enemy left between 2,000 and 3,000 dead on the battlefield. The British casualties numbered about 1,500. These were evacuated to the sub-divisions of the field ambulances opened at the Abu Roman Mounds either by mahela or by empty supply convoys. While the Turkish counter-attack was in progress there was great scarcity of dressings and splints and great care and economy had to be exercised. Splints were made from empty packing cases ; the supply of anti-tetanic serum was very low and none was available from the medical store depôt at Amara.

When the 13th Division went into action on the left bank, Nos. 39, 40 and 41 Field Ambulances were without the greater part of their transport. Nos. 39 and 40 Field Ambulances were opened at Ora, while No. 41 formed advanced dressing stations to deal with the wounded. Soon No. 40 Field Ambulance became overcrowded with sick and wounded ; it became immobile and did not rejoin the division until 2nd May. No. 39 Field Ambulance was moved up to Sandy Ridge for the attack on Sanna-i-Yat and formed a main dressing station for the 13th Division for that battle. The arrangements worked well. All the actions were fought in such circumstances that the distance between the firing line and the evacuating unit was never more than 7,000 yards. Further, the medical units of the 7th Division assisted the 13th Division medical units with army bearer corps personnel and transport.

Up to this time the losses suffered by the 13th Division numbered 1,400 wounded on 5th April at Hanna and Falahiya, and 1,300 on 9th April at Sanna-i-Yat. On 17th April the division crossed to the right bank of the Tigris and advanced to the Abu Roman Mounds. During the period 17th to 20th April they were engaged in severe fighting at Bait Aissa, and the division lost 600 from wounds. The medical arrangements were similar to those made for the battle of Sanna-i-Yat. No. 41 Field Ambulance was used as a main dressing station where wounded were collected until the fighting ceased, when they were transferred to No. 39 Field Ambulance which remained at Sandy Ridge. During this evacuation the "Aerial" again did good work.

These operations had failed to dislodge the Turk and so relieve Kut. When Kut surrendered on 29th April, Lieut.-General Sir Percy Lake arranged with the Turkish Commander-in-Chief, Khalil Pasha, that the more serious cases among the sick and wounded of the garrison of Kut would be handed over to the British in exchange for an equivalent number of Turkish prisoners of war.

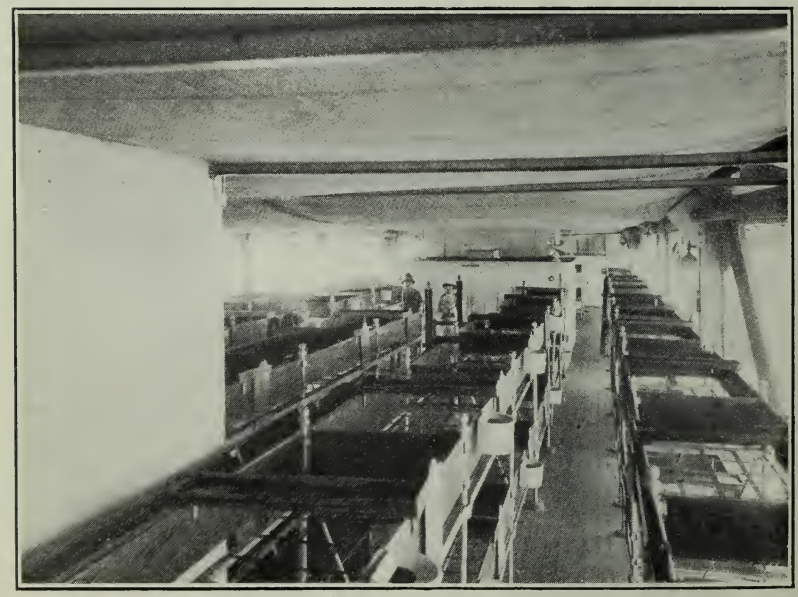
Improvised method of water clarification, Mesopotamia.

During the operations a serious outbreak of cholera spread to the 3rd, 7th, and 13th Divisions and, unfortunately, no preparations to combat this disease had been made.* The troops suffered from lack of rations, unsuitable clothing and an inadequate supply of pure water. The majority of units had no water-carts. Improvised tanks had to be made from tarpaulins which soon became worn out and were not easily replaced. There was no method of sterilizing water in bulk and there is no doubt that the unsedimented and improperly sterilized water was responsible for a great number of cases of sickness, more especially of colitis and diarrhœa. The rations were scanty ; fuel was short, and what there was was difficult to convey to the troops.

---

* *See* Diseases of the War, Vol. I, Chapter IV.

H.S. "Sikkim."



Top deck of H.S. "Sikkim," showing arrangement of hospital berths.

Failures in the medical arrangements were not due to lack of organizing ability so much as to the general shortage of units, equipment and transport from which the force as a whole suffered. Medical units had to be split up into detachments ; improvised casualty clearing stations had to be formed by them ; the wounded had to be evacuated in any vehicle that was obtainable ; the river vessels had not been properly organized ; and personnel and a great deal of equipment for these river steamers had to be provided by the field medical units. The sick and wounded, however, were better treated, more carefully looked after and more easily evacuated than on the previous advance up the Tigris. The hospital ship " Sikkim" arrived at Ora in the latter part of April, and while assisting to evacuate the British sick and wounded from the relieving force, also served a useful purpose in evacuating the sick and wounded repatriated prisoners of war from Kut.

CHAPTER IX.

MEDICAL ARRANGEMENTS DURING THE SIEGE OF KUT-AL-AMARA.

DURING the battle of Ctesiphon the D.D.M.S. of the Expeditionary Force informed the senior medical officer at Kut-al-Amara by telegram that the troops were retiring and 3,500 wounded were being evacuated to Kut. The medical units stationed in Kut made all possible preparations, collecting and pitching every available tent, and improvising equipment ;

View of Kut-al-Amara.

straw covered with waterproof sheeting had to serve the double purpose of floor and bed. It was fortunate that an advanced depôt of medical stores had arrived in Kut some time previously so that there was no shortage of medicines and dressings. Extra accommodation for lightly wounded was obtained by using a derelict two-decker barge then anchored in the river, by pitching tents amongst the palm trees and by establishing an aid post on the river bank for dispensing hot coffee, milk and soup.

At the same time the news that a local Arab leader with a following of several thousand was preparing to attack the camp added to the trials of those in Kut, and, as it was feared that the townspeople might prove treacherous, defences had to be made. Patients who were sufficiently convalescent to carry rifles provided the sole garrison for this purpose.

The serious cases had to be brought from the ships to the hospitals, nearly a mile distant from the point of disembarkation, over roughly made, dark and dusty paths by means of springless transport carts or volunteer stretcher-bearers. The process of transporting them taxed the resources of the staff. Every possible arrangement was made for rapidly rearranging or changing dressings, for feeding the patients and combating shock. Many of the wounded had had little or no food for forty-eight hours. They fell heavily asleep as soon as they had eaten food.

Whenever empty transports became available the wounded were transferred to them for their further journey down river to Amara. On the 28th November one convoy left, carrying with it the Army Commander and Staff, but it was held up by hostile Arabs and had to return. Two days later the convoy again started with every available ship loaded with sick and wounded and a detachment of Indian infantry and two mountain guns as escort. This time they were successful in reaching Amara. During the next two days in Kut all sick and wounded who were not considered likely to recover within a fortnight were put on board some sort of river craft and the convoy despatched to Amara before the blockade of the town began.

On the 3rd December 1915, the column under Major-General Townshend marched into Kut retreating before a superior force of Turks. Seldom have British troops accomplished longer or more exhausting marches than those of the 1st and 2nd December 1915, practically without food and under terribly trying conditions. Such was the exhaustion of the troops that no attempt at digging trenches was possible until next day, when the Turkish forces were only about ten miles away. Men lay down where they halted and could not be moved. The enemy, however, was in a similar condition and no attack was made. Several days were spent in organizing defences before the siege began in grim earnest. The hospital camps lay on the outskirts of the town and a number of shells fell there, fortunately without many casualties. Such a site was impossible, and arrangements were accordingly made to abandon it and to move all hospitals into billets in the town.

On the arrival of the column in Kut, the sick and wounded in hospitals there numbered 21 British officers and 411 British other ranks ; 29 Indian officers and 1,665 Indian other ranks ; 40 followers and 35 Turks, making a total of 2,201. Of these 709 were despatched down river on the 4th December, and the

remaining British and Indian sick were distributed in the hospitals as follows :—

	British.		Indian.	
	Officers.	Other Ranks.	Officers.	Other Ranks.
British General Hospital (50 beds) ..	12	179	—	—
Indian General Hospital (100 beds) ..	—	—	22	243
Indian Stationary Hospital (200 beds)	—	—	—	526
No. 4 Field Ambulance	—	—	—	240
Convalescent Depôt	—	79	—	167

At the commencement of the siege the strength of the garrison was as follows :—

	British.		Indian.			Total.
	Officers.	Other Ranks.	Officers.	Other Ranks.	Followers.	
Fighting force ..	206	2,276	153	6,941	3,500	13,076
In Hospital ..	12	258	22	1,176	42	1,510
Total to be rationed ..						14,586

There were only two large sites in Kut where hospitals could be placed, namely, the serai and the covered bazaar. The former, situated at the north-west angle of the town, was, however, directly exposed to both rifle and gunfire, and was therefore only used occasionally as a convalescent depôt to relieve the pressure in the British general hospital and field ambulance. The covered bazaar, capable of holding approximately 1,000 patients, was selected for the British and Indian general hospitals, the Indian Stationary Hospital and No. 106 Field Ambulance. The occupants of the bazaar were turned out, and every available sweeper or menial was set to work to clean it up. The filth of the hovels was indescribable, and it took 200 men two days to make them at all habitable for patients. The carefully built hospital huts were abandoned on the night of the 6th December, and under cover of darkness all patients and as much equipment as possible were transferred to these new quarters. Owing to lack of transport and personnel

this was no easy task but it was completed eventually. Even in the bazaar, however, it was soon found that the safety of the patients was by no means assured. Close by, on the river bank, was one of the few possible sites for the guns, and a battery was established there. Many a shell, therefore, that was probably intended for this battery dropped on one of the hospitals. Seven 40-pound shells hit the covered bazaar hospitals during the night of the 10th December alone, and in the course of the siege 103 shells and three high explosive aeroplane bombs entered the various hospitals. The casualties from these were 31 patients and 29 personnel killed, and 47 patients and 38 personnel wounded, making a total of 78 patients and 67 personnel.

The field ambulances and advanced depôt of medical stores were also transferred to billets.

The general and stationary hospitals were used for the treatment of all severe wounds and, as far as practicable, for cases of serious illness. The work in these units was carried out under high pressure throughout the siege, and there were occasions when the strain was overwhelming. The conditions under which the work had to be carried on were depressing in the extreme. All the buildings leaked, and the thoroughfares were muddy puddles after every shower. Patients had of necessity to lie on rain-soaked beds, or on the muddy floors of the cubicles. Operating "theatres" were mud-walled rooms with roofs of matting and mud, through which a hole was cut to give light. This had to be covered with sheeting to keep out the dust or rain storms, according to the season.

The constant shelling and sniping on the part of the enemy necessitated the admission of the wounded into hospitals at all hours of the day and night; on several occasions these cases had to be dressed and operations performed during a bombardment. The daily round of treating and dressing the cases, whose recovery seemed impossible under conditions of slow starvation, lack of fresh air, absence of all cheering and inspiriting influences, and of constant acute disappointments at the repeated failure of the relief operations, had to go on, but it took its toll of break-downs amongst the medical staff. Normally the medical units were equipped and staffed to deal with a total of 650 patients. The daily average number of sick and wounded under treatment was 1,351, and on Christmas Day 1915, after a determined attack on the Fort by the Turkish forces, there were 1,140 sick and 718 wounded in the hospitals.

As already stated, a convalescent depôt for British troops was established in the serai to relieve the pressure in the British general hospital and in the field ambulances.

Regimental aid posts consisted of dug-outs provided with covered protection against shrapnel. Wounded from the trenches were sent to dressing stations which had been formed of excellently made dug-outs with shell-proof overhead cover in the date grove to the north of the town. Here wounds were redressed, and the patients were fed and rested before being sent on to the hospitals. The date grove, however, was exposed to a certain amount of sniping and shellfire and had to be abandoned. After that, bearer divisions went out to the front-line trenches and fort in the dusk of the evening with stretchers, and, if necessary, transport carts, and brought the wounded into the medical units. In the early stage of the investment, before communication trenches were completed, this work had to be carried out under constant sniping, and, on a few occasions, under heavy rifle fire, during which some of the army bearer corps personnel were wounded.

Conditions were decidedly unfavourable for sick and wounded. It was impossible for the available medical staff to give patients all the care and attention they needed. The improvised hospitals, especially those in the covered bazaar, were defective in ventilation, lighting and hygienic arrangements generally. The patients were being slowly starved, and had but a limited amount of hospital comforts. The hospitals were short of their usual number of medical officers and medical subordinates, and a large part of the equipment of Nos. 2 and 106 Field Ambulances had had to be abandoned during the retreat from Ctesiphon.

Five medical officers, two assistant surgeons and one sub-assistant surgeon of regimental units were killed or wounded at Ctesiphon and their places had to be partly filled from the field ambulances' staff. During the siege one regimental medical officer was killed and one died, one regimental assistant surgeon and one sub-assistant surgeon were killed and one assistant surgeon died, while over 20 per cent. of the medical officers and medical subordinates were on the sick list. Some of the medical officers and subordinates previously attached to the different units had accompanied the convoys of wounded sent down river before the siege began, and their services were thus lost to the garrison. Consequently the work thrown on the remainder of the staff was exceedingly severe, and carried out in circumstances of exceptional difficulty.

Several soldiers of British battalions were obtained to act as cooks and nursing orderlies in the hospitals, and Indian soldiers were detailed to act as ward orderlies and to help in the kitchen. Convalescent patients were also employed in carrying out these duties. The menial establishment was insufficient, but the shortage in sweepers was made good from brigades, whose units possessed more than were required under existing conditions. The work of this menial establishment was carried out with great efficiency and a cheerful disregard of danger and acute discomfort.

A noteworthy feature of the medical organization during the siege was the strict economy observed in the use of drugs and dressings. It cannot be said that patients got every drug they required, but serious cases were, as far as possible, given all that was prescribed for them by medical officers, and the dressings for the wounded were ample throughout. In addition to the good supply brought with it by No. 9 Advanced Depôt of Medical Stores to Kut-al-Amara before the siege, there were thirty-one reserve dressing boxes, Red Cross gifts to British infantry units, which, with the permission of the commanding officers, were taken over by the Medical Store Depôt, and a few boxes of medical comforts were found in the supply stores. The first task was to determine how long these stores would have to last, and the estimate made was three months. As a result of a survey made early in December there appeared to be sufficient for that period. However, when the G.O.C. intimated about the 20th January that the food of the garrison could last until the 17th April, the issue of drugs, dressings and disinfectants had to be regulated accordingly. During the last month of the siege there was a decided shortage of most drugs. The universal prevalence of diarrhœa and gastro-intestinal disorders led to an early exhaustion of astringents, whilst "fevers" and malarial relapses drained the supply of diaphoretics. However, an aeroplane service made it possible to obtain the most essential drugs and dressings at all times. By this means large supplies of astringents were received. Twenty thousand lead and opium pills, 12,000 'tabloids' of Dover's powder as well as phenacetin, salicylate of soda, surgical dressings, large-sized drainage tubes and the most urgently required antitetanic serum were obtained in this manner. In addition local resources were also exploited. Calcium chloride was manufactured from hydrochloric acid and lime, and this was issued at the rate of about 2 lb. daily for about two and a half months for patients suffering from scurvy. Dover's powder was made up from

opium, ipecacuanha powders and bicarbonate of soda. Castor oil was obtained from the Flying Corps, who were working the grain-crushing engines, and Epsom salts from the veterinary section. Cotton-wool was bought from the bazaars, cleaned, teazed, sterilized and used for septic surgical cases. Calico and other cloth were bought and used in place of gauze and as bandages.

With strict economy, the supply of disinfectants was made to last throughout the siege. At the beginning there were 120 gallons of saponified cresol in store. During March and April, when flies increased considerably in numbers, and were soon in swarms everywhere, adding enormously to the discomforts already existing, the shortage of disinfectants was particularly felt.

The climate in Kut-al-Amara during the siege up to about the middle of March 1916 might be described as wintry. In the first three months it was decidedly cold, and from the 15th January to the 8th February 1916 it froze every night. The troops in the trenches, especially the Indians, found this very trying, and high winds and rainstorms intensified their sufferings. From the 18th to the 20th January the trenches were flooded with water at an icy temperature, and on the 20th several units holding the first-line trenches were up to their knees in water, and about thirty Indians were brought out collapsed from cold. Frostbite was common, and led in some cases to gangrene of the toes. Trench rheumatism, pneumonia, pleurisy, bronchitis and sore throat were prevalent. The lowest temperature reached was 24·8° F. on the 31st January. After the middle of February, the days became warmer and the night cold less severe. In March there was a period of ten days' cold weather associated with rain, but the days were mostly bright and pleasant. In April the nights were also pleasant and the days were then becoming warm. Fortunately, before the arrival of the floods in March, the Royal Engineers, in spite of heavy sniping and shelling, had completed the building of a dam from the fort across to the river on the west, which served to keep the town from being flooded.

The sanitation of the areas occupied by the troops and followers was conducted on the usual principles. Throughout the siege the supply of water was always difficult, both as regards the billeted troops and those in the neighbourhood of the town. For the first few days water was drawn directly from the river, but subsequently this was impossible on account of the activity of the enemy's snipers. Then trenches

communicating with the river were made and pumps protected by mahelas were fixed. Even under this arrangement casualties were frequent. Later the water supply was obtained from three excavations lined with canvas tarpaulins, each of 27,000 gallons capacity and situated about 200 yards from the river. They were connected with raised surface uncovered channels which ran to the river, and were filled by pumps working on the bank. Of the three troughs two were used as settling reservoirs whence the water was syphoned into the third from which the supply was drawn. This arrangement ceased for a time, when the level of the river fell below that of the suction pipe of the pump, and the banks fell in and blocked the pump ; then hand pumps on the river bank had once more to be used.

The reservoirs were cleared of silt and deposit periodically and the whole arrangements placed in charge of a water picket. Usually the reservoirs were filled late in the evening so that, by next day, all suspended matter had deposited and the water was fairly clear ; this economized the supply of alum which had previously been used as a precipitant. The reservoirs were under cover, and all drinking water was chlorinated. After a similar reservoir had been excavated for the civilians, the number of casualties from sniping was reduced.

Any defects in the sanitation of the area during the siege were due to overcrowding of the town by troops and congestion of the civil population in the remaining houses ; deficiency of the number of Indian sweepers ; unwillingness of the Arab labourer to work under fire ; bad weather conditions ; and the insanitary habits of the local inhabitants.

From 15th December 1915, British troops were put on a reduced ration of meat (12 oz.) and fresh potatoes (6 oz.), and the Indians on a lowered ration of dhall (2 oz.). The following tables give the composition of the rations at different periods during the siege. On 22nd January the rations consisted of :—

British.

	lb.	oz.
Bread		12
Meat		8
Butter or cheese		3
Potato meal		3
Pickles		1
Jam		3
Dates		2
Tea		$\frac{1}{3}$
Sugar		$\frac{1}{2}$
Salt		$\frac{1}{2}$
Ginger		$\frac{1}{3}$
Fuel	2	

Indian.

	lb.	oz.
Atta		8
Rice		8
Gur		$\frac{1}{4}$
Ghi		2
Ginger		$\frac{1}{2}$
Dhall		2
Chillies		$\frac{1}{8}$
Garlic		$\frac{1}{8}$
Dates		3
Potato meal		2
Salt		$\frac{1}{4}$
Fuel	1	

The following rations were issued to the garrison from the 4th March :—

British.	lb.	oz.	*Indian.*	oz.
Bread		12	Barley meal	12
Horseflesh	1	4	Barley whole	6
Jam		1	Ghi	1
Salt		½	Salt	¼
Dates		1½	Dates	1½
Ginger		⅓	Ginger	½
Oatmeal		2	Turmeric	⅛
			Chillies	⅛
			Meat*	8

* To those who would draw it.

On the 11th March the rations consisted of :—

British.	lb.	oz.	*Indian.*	oz.
Bread		10	Barley flour	10
Meat	1	4	Barley unhusked	4
Jam		1	Ghi	1
Salt		½	Ginger	½
Ginger		⅓	Turmeric	⅛
Oatmeal		2	Meat*	8
Dates		1½	Dates	1½

* To those who would draw it.

For the British troops this was just a little more than a subsistence diet ; for the Indians it was less than a subsistence diet, resulting in a loss of stamina and causing scurvy. From the 11th March a concentrated soup was made for all British troops. It was issued in the evening and was greatly relished and appreciated. The above tables were modified from time to time. For example, from the 14th March British troops had 1½ oz. butter, 1½ oz. bacon and 1 oz. cheese added to their rations twice a week. This was continued for fourteen days, one of these additions only being given each day.

Fresh meat was issued up to the beginning of January, after which tinned meat was used till near the end of the month. Beef was obtained by killing the bullocks of the two heavy batteries and from horseflesh. The consumption of these was commenced on the 29th January 1916 and beef from these sources was issued on alternate days. There was a prejudice against eating horseflesh amongst all Indian troops except Gurkhas who ate it from the first day of issue. Gradually other classes of Indians began to use it, especially Mohammedans ; it was with difficulty that Sikhs were induced to take to it. Rajputs, Jats and Mahrattas held out longest and were most weakened.

Green vegetables were procurable in the bazaars until the middle of January, but the regular issue of these to troops

and followers had to be discontinued towards the end of December. The vegetable gardens planted at the end of January produced on an average 150 lb. of green vegetables after the 30th March. These were issued to the hospitals and small units, but there was never sufficient for a general issue. All units used the green herbs obtainable on the plain as vegetables from about the middle of March. Wild mustard, wild carrots, a species of clover, mint, a small kind of thistle, dandelions and plantains were the chief vegetables obtained in this way. Medical officers were unanimously of opinion that the use of these green herbs had a marked influence for good in staying the incidence of scurvy.

As there were some poisonous plants, such as stavesacre, spurge, wild *Cannabis indica*, datura and a convolvulus runner, found growing alongside the edible plants, samples of the edible and poisonous plants were collected and placed in all headquarters offices.

From the 8th January half an ounce of lime juice was given every second day to all Indian troops and followers. About half of the lime juice was of excellent quality; the other half was indifferent. A daily issue of an eighth of an ounce of dried tamarind was made to Indian troops and followers from the 8th February. British troops received a daily ration of pickles from the 8th January. A large quantity of dried limes was discovered in the town and issued to Indian troops and followers as an anti-scorbutic from the 14th February.

As a result of a discussion between the A.D.M.S., the A.Q.M.G. and the Assistant Director of Supplies, it was decided that the following articles were the most essential, in order of urgency, for British and Indians: Salt, flour, butter, cocoa, and sugar for the British, and salt, atta, ghi, dhall and dates for the Indians. About the 15th April, an aeroplane dropped 50 lb. of chocolate which was given as a ration to British troops. Towards the end of March the supply of salt was rapidly diminishing. By the 29th of the month there was only sufficient for a short ration of it for a fortnight to British troops and for five days to Indian troops. However, after searching the town, the supply officer obtained 800 lb. of salt which was issued as a ration of about one-tenth of an ounce daily per man. At a later date an aeroplane dropped 80 lb. of salt.

An issue of rum, or its equivalent in tea and gur for Indian troops, was made from the 18th December 1915 to all troops

every fourth day for about six weeks, when the supply ran short. British troops also received a pint of beer daily for about a month during the early part of the siege.

Up to the end of February the troops and followers were able to purchase in the bazaars a moderate amount of extra food, such as chappatties, fried cakes, Arab confectionery, dhall, beans of various kinds and tea.

The absence of sugar in the rations was felt by all. Its issue ceased early in February and up till then the troops had been on short rations of it. About the middle of February several pounds of saccharin were wired for and a supply of $4\frac{3}{4}$ lb. of it was dropped by aeroplane about the first week of March. It was insufficient to make a general issue and was reserved for the hospitals and officers of the garrison.

As many of the men were suffering acutely from the pangs of hunger, 2 lb. of opium were obtained by aeroplane, and 14,000 one-grain opium pills were given to medical officers of regiments for issue to selected cases. It undoubtedly helped to ameliorate the intensity of the men's sensations.

British troops felt the want of tobacco greatly, and were prepared to forego part of their ration if they could get enough tobacco for a few smokes a day. On the 14th April the men of the 2nd Dorset Regiment were found to be smoking three different kinds of substitutes, dried used tea-leaves, powdered dry ginger, and dried and broken up orange leaves. Many officers were doing likewise.

Great difficulty was experienced over fuel for cooking rations. After all brushwood had been cut and available timber of houses used, crude oil, of which there was a large stock, was used, but special stoves had to be constructed for it. Fuel oil was taken into use generally on the 5th February.

The blankets in the supply stores were issued to the garrison. There were sufficient to ensure that each man got two blankets, and a certain proportion were given three.

The ordinary ration issue was supplemented in hospitals by the issue, until exhausted, of the stock of medical comforts which at the commencement of the siege was in charge of the supply service. Early in the siege this stock was estimated and the issue regulated, but the most that could be said was that it was sufficient for a two months' supply. Strict economy had to be commenced as early as the 21st January and continued until the supply became exhausted about the middle of April. The chief item was tinned milk, of which there were 14,500 lb. in stock. At first a liberal issue was allowed, but at each

successive extension of the time limit for the duration of the siege the issue had to be reduced considerably. Throughout the siege, however, small quantities of food and comforts appeared from hitherto undiscovered sources and were secured for the hospitals.

The diseases or conditions mainly responsible for inefficiency during the siege were scurvy, causing 1,050 admissions to hospital, dysentery 684, malaria 551, pneumonia 487, diarrhœa 528, beri-beri 155 and bronchitis, jaundice and gastro-enteritis due to debility and starvation. The last-named diseases caused 165 deaths during the last five weeks of the siege.

From the 4th December 1915 to 29th April 1916 there were 2,446 wounded and 537 killed. Of the wounded treated in hospital 488 died of wounds, and 1,696 returned to duty. Many of the cases shown as " returned to duty " were in poor health and were crippled in one way or another, although they were able to walk and live in their regimental lines.

The total number of deaths in Kut from the 4th December 1915 until the fall of Kut on the 29th April 1916, is shown on the following table :—

	Killed.	Died of Wounds.	Died of Disease.	Total.
British officers	9	10	4	23
British other ranks	84	105	58	247
Indian officers	8	7	5	20
Indian other ranks	369	278	531	1,178
Followers	67	88	123	278
Total ..	537	488	721	1,746

The short distance between the firing line or other place where the injury was sustained and the general hospitals, and consequently the brief period between the infliction of the wound and some permanent form of surgical treatment, had exercised a favourable effect on a large number of serious cases, especially compound fractures and wounds of the chest and abdomen. There was very little exposure after the wound was received, as the regimental medical officer had usually applied the first field dressing himself. There were, however, the many unfavourable factors already referred to, which sometimes more than neutralized these favourable conditions.

The most serious complication in the later stages of the siege was the bad effect on the healing of wounds of the steadily diminishing ration, the lack of invalid food, the outbreak of scurvy amongst Indian troops and the presence of a certain

amount of beri-beri amongst the British. In many of the cases that developed scurvy the healing process stopped altogether and wound surfaces bled easily each time they were dressed. In other cases the patients grew rapidly weaker and succumbed to exhaustion or to septic absorption from suppuration of moderate severity. Granulating surfaces became indolent ulcers or raw bleeding surfaces; bone died without reaction enough to become separated; suppurating cavities ceased to produce "laudable pus" and instead poured out a dirty thin sanguineous discharge in the neighbourhood of which tissue necrosis took place and induced absorption of morbid products, which often brought the patient to an untimely end. Wounds in beri-beri cases, of which several occurred in the hospitals, healed very slowly, and this retardation of the reparative process was especially noticed in granulating wounds.

There were thirty cases of tetanus of whom only four recovered, despite the fact that the incubation period in all but four cases was six days or more. Out of the thirty cases, nine were shell wounds and four bomb wounds; only one of these recovered. Half the cases proved fatal within forty-eight hours. In the early days of the siege, when most of the cases occurred, there was only a small quantity of antitetanic serum available; later on an abundance of it was received, and its prophylactic use was made possible. Several cases of tetanus were treated by carbolic acid injections, but without success.

There were only three instances of gas gangrene, of whom two died and the third recovered.

The major operations performed during the siege of Kut were thirty-two craniotomies, forty abdominal sections, thirty-six amputations and six ligations for aneurysm. The results of the craniotomies were disappointing. Abdominal section saved several lives that would otherwise have been lost. Amputations on the whole did well. Conservative treatment of limbs became less and less possible as the siege wore on, and although practised as much as possible, had to be modified and amputation carried out more frequently as the food supply diminished.

On the 22nd April 1916, a very heavy bombardment was heard down river from 10 to 11 a.m., and the hopes of the garrison ran high. However, in the evening the following telegram was received from headquarters: "22nd April, 7.50 p.m. Much regret that the attack on Sanna-i-Yat position this morning was repulsed." The garrison was now absolutely done; men were dying at an average of fifteen per day, and

the condition of the patients in hospital was pathetic. On the night of the 24th/25th April the " Julnar," which was reported to have on board 250 tons of food, was to make an attempt to run the blockade and left the relief force at midnight. The attempt was ill-fated, as shortly after midnight a terrific fire of guns and musketry broke out, and at daylight the " Julnar " was seen alongside the right bank of the river, captured by the Turks. Lieutenant Firman, R.N., and his assistant, Lieut.-Commander Cowley, R.N.V.R., who were in command, were both killed and the crew made prisoners.

The situation had now to be faced, for the extreme limit of resistance had been reached and any further hope of protracting the siege had to be abandoned. On the 26th April General Townshend commenced negotiations with Khalil Pasha, the Turkish commander-in-chief, but these were broken off by Enver Pasha, who insisted on unconditional surrender. Accordingly, on the night of 28th/29th April, all guns, material, ammunition, tentage and other material, including the wireless installation, were destroyed, and on the following day a Turkish battalion marched into the town and took over the guards. A conference was shortly arranged between the heads of the medical services of the two forces to decide upon the supply of rations and the treatment and exchange of sick and wounded. The next few days were spent in showing the Turkish medical staff round the hospitals and field ambulances. All patients were seen and classified according to the Turkish estimate of their condition into cases for exchange as likely to be unfit, or those to be retained as prisoners. Some of the former were evacuated on the 1st May by H.S. " Sikkim," which came up from the relieving force. This hospital ship evacuated the cases to the British medical units and returned in a few days for the remaining cases. The medical staff left in Kut were taken down to the river bank to await the arrival of another small river boat. Once more a bitter disappointment was in store for them, as the news was brought that exchange negotiations had fallen through and the medical staff were to proceed to Baghdad with the remainder of the sick and wounded. Accordingly, on the 9th May 1916, all medical personnel, including Colonel Hehir, who had been A.D.M.S. during the siege, together with British and Indian patients who were left in Kut, emaciated and disease-stricken, were embarked on the Turkish ship " Khalifa " and on the captured " Julnar," and leaving the ill-fated town they proceeded into captivity for many weary months.

CHAPTER X.

THE REORGANIZATION OF THE MEDICAL SERVICES IN MESOPOTAMIA IN 1916.

AT the beginning of May 1916 Surg.-General F. H. Treherne arrived from France, where he had been Director of Medical Services of the Third Army. He had been appointed D.M.S. of the Mesopotamia Expeditionary Force and took over Surg.-General Hathaway's duties. He was accompanied by Colonel M. H. G. Fell, R.A.M.C., and at once made an extended tour of the force. The reorganization of the medical arrangements at the front, on the lines of communication, and at the base was then commenced. So great was the need for this reorganization and so beneficial its results that it has been considered advisable to give a somewhat detailed account of the various schemes instituted and carried out under General Treherne's administration.

The Front Areas.

Certain of the medical units which had been operating with the Tigris Corps were sent to Nasiriya to a new division, the 15th Indian Division, which was being formed under Major-General H. T. Brooking. Lieut.-Colonel G. B. Irvine, I.M.S., who had acted as D.D.M.S. of the Tigris Corps, was appointed A.D.M.S. of this division, with Captain T. J. Mitchell, R.A.M.C., the officer commanding No. 7 British Field Ambulance of the 3rd (Lahore) Division, as his D.A.D.M.S. His duties as D.D.M.S. of the Tigris Corps were taken over by Colonel B. B. Grayfoot, I.M.S., the A.D.M.S. of the 3rd (Lahore) Division.

On the 20th May, the Dujaila Redoubt and Es Sinn position, which had been evacuated without fighting by the Turkish troops, was occupied by the 3rd (Lahore) Division. The front held at this time by the divisions of the Tigris Corps was Sanna-i-Yat and Falahiya by the 7th Division on the left bank, and on the right bank the Es Sinn position at first by the 3rd Division and later by another new division formed in Mesopotamia, the 14th Division. Communications on the right and

left banks down river to Shaikh Saad were taken over by the 6th Cavalry Brigade, the 13th and 14th Divisions, and later by the 3rd Division.

The 14th Division had been formed during May from the 35th, 36th and 37th Infantry Brigades. Headquarters of the division were stationed at Shaikh Saad. Lieut.-Colonel C. N. C. Wimberley, I.M.S., was appointed A.D.M.S., and Major T. G. F. Paterson, I.M.S., D.A.D.M.S. The medical units assigned to this division were Nos. 1, 20, 21, 22 and 135 Combined Field Ambulances.

During the first half of June the 13th Division was moved from the vicinity of Abu Roman Mounds and Mason's Mounds to Shaikh Saad. It remained there until the end of August, when it was sent down to Amara. The men of this division were in a poor state of health as the result of the hard work, carried out for the greater part of the time on short rations, and exposure during April and May under tropical conditions of temperature and rain. They had suffered heavy losses in the different battles and for a time cholera had been rife amongst them. At Shaikh Saad they had had arduous work in convoy duties, loading and unloading ships and constructing defences. They were housed in poor tents, which barely protected them from the fierce rays of the sun between the hours of 8 a.m. and 6 p.m. Their head-dress was also defective ; many of the men were without helmets altogether and some of those in use had been badly damaged, rendering them practically useless. These deficiencies could not easily be rectified, as supplies were short. The monotony was intense ; there were no amusements, nor any change from the dull daily task. The men who had come from England and had previously had no great experience of a summer in the tropics became depressed. The sick rate rose with alarming rapidity and the patients showed little or no recuperative power. During June 1916 there were seldom fewer than 1,000 cases in the field ambulances each day ; during July this figure rose to 1,500, while later the number in hospital exceeded 2,000. The chief causes of admission were dysentery, diarrhœa, jaundice, enteric fevers, sand-fly fever, malaria, effects of heat, septic sores and minor surgical conditions. The field ambulances were working as stationary hospitals. They were overcrowded and there was a deficiency of tents. All cases from the 13th Divisional field ambulances were transferred direct to ships and did not pass through a casualty clearing station. Evacuation was very uncertain as the shipping available could not cope with the number of cases that obviously

ought to have been evacuated. After the division arrived at Amara the temperature became lower and the better conditions and feeding rapidly improved the health of the troops and the sick rate remained low.

Until the 23rd July 1916 the administration of the Tigris Corps extended from the front to Shaikh Saad and included all the casualty clearing stations and stationary hospitals at that place. After that date Shaikh Saad was placed under the administration of the lines of communication and a separate A.D.M.S. was appointed.

During the summer of 1916 the attention of the medical service was mainly occupied in the commencement of the organization of an efficient system of river and road evacuation, leading, eventually, to field ambulances being used for their authorized work; to the establishment of casualty clearing stations and stationary hospitals at the advanced base, Shaikh Saad; to the organization of efficient sanitation and the adequate supply of pure drinking water, proper rations, suitable and protective tentage. There were few casualties from wounds, but the casualties from sickness were very severe and the health of both the British and Indian troops was very unsatisfactory. The intense heat, lack of suitable tentage, scarcity of rations and the loss of moral from the failure to relieve Kut-al-Amara, all acted as contributory causes to the excessive sick rate.

Among British troops the principal diseases were intestinal disease, jaundice, fevers, including the enteric group, sand-fly fever, pyrexia of uncertain origin and the effects of heat. Among Indian troops intestinal diseases and fevers were also much in evidence, but scurvy was of most frequent occurrence. It alone was responsible for the loss of several thousand men to the force. The rations contained insufficient anti-scorbutic vitamines and as a contributory cause very often the authorized field ration was not issued. It was found that practically every case of scurvy had to be evacuated to India. The 7th Division established a scurvy camp under a medical officer who had previously had wide experience of this disease in India. In this camp cases of pyorrhœa alveolaris were differentiated from true scurvy. Clinics were held for newly joined medical officers and when cases of true scurvy were received in the early stages some success was attained in the treatment of them. Some interesting facts regarding the causation of artificial scurvy were brought to light during the epidemic. One type was called "scorbutic" swelling of the knee joint. This

was caused by passing a thread treated with a caustic through the subcutaneous tissue of the popliteal space or above the patella. " Scorbutic " gums were caused by rubbing the gums with dhobie nut or some other caustic.

An improvement in the supply of drinking water was effected by obtaining large tanks, or improvising tanks from large tarpaulins. Suspended matter in the water was first allowed to settle, and the water was then chlorinated. For the supply to camps not on the river bank open water channels were constructed and policed. These led into large central chlorinating tanks where the water was treated under medical supervision. The method of chlorination first used was the Nelson-Treherne method, but this did not prove very suitable for chlorinating water in bulk and it was consequently given up in favour of the use of bleaching powder. Summer clothing was issued gradually to the troops, although it was not received in the early part of the summer.

The methods of sanitation became standardized and improved, and assistance in furthering sanitation was rendered by the Medical Advisory Committee sent out to Mesopotamia by the War Office.* The divisional sanitary sections had been rescued from the lines of communication and were present with all divisions. At times they were under strength, but the assistance rendered by them was very great.

The Tigris Corps area was visited by Colonel Sir Victor Horsley, A.M.S., Consulting Surgeon, Colonel W. H. Willcox, A.M.S., Consulting Physician, and by Surg.-General T. J. O'Donnel, the newly appointed D.M.S. in India, who visited the force and inspected all areas during the summer. Changes were made in the administrative medical personnel of the corps. Colonel Grayfoot was evacuated sick in July and was succeeded by Colonel W. H. Starr, A.M.S. A Corps Entomologist, Mr. L. Harrison, was appointed in June. Major T. S. Gloucester, I.M.S., did duty as Corps Bacteriologist.

While the evacuation problems were being solved it was necessary during practically the whole period to use certain field ambulances as clearing stations behind the front area, and, owing to the lack of river transport for evacuating the cases, all field ambulances had to be expanded enormously to cope with the sick. Beds, extra clothing and equipment were obtained for these units so that patients could be treated properly. At first the casualties were evacuated on any and every ship calling in the corps area. In July the hospital ship " Ardlui " was allotted to the Corps as a ferry ship,

* The members of the Committee were :—Lt.-Col. A. Balfour, R.A.M.C. (T.) ; Lt.-Col. G. S. Buchanan, R.A.M.C. (T.); Lt.-Col. J. C. G. Ledingham, R.A.M.C. (T.); Lt.-Col. C. M. Wenyon, R.A.M.C. (T.).

plying between the front and Shaikh Saad, and later the "Coromandel" and a paddle steamer were employed for the same purpose. All these ships had medical equipment and personnel on board, which was a great advance on the previous procedure and was the commencement of the river ferry service evacuation from the forward areas. Motor ambulance launches had arrived at the front and were used to evacuate the cases from advanced dressing stations to field ambulances, and from field ambulances to casualty clearing stations. Evacuation by inland routes was never satisfactory owing to the bad state of the roads, the necessity of travelling at night during most of the period for the sake of coolness, and the lack of suitable ambulance transport. Road evacuation had, however, to be carried out from the Es Sinn area. The sick from this area were evacuated at first by motor ambulance cars and other vehicles direct to Sandy Ridge. Later, they were sent from Es Sinn to Shaikh Saad by the Twin Canals, the journey being broken at the latter place where an expanded combined field ambulance was opened to accommodate them when passing through. A narrow gauge railway from Shaikh Saad to Es Sinn was opened in August 1916, and road evacuation then ceased, returning empty supply trains being used instead.

The sickness which affected the corps as a whole wrought equal havoc among the medical personnel. Every unit had large deficiencies of medical officers, subordinates and other personnel; and, as every unit was crowded to overflowing with sick, very great strain was thrown on those who withstood the ravages of disease. The question of tentage for sick was very acute during the greater part of this period. Few European pattern tents were available; there were only a few 160-lb. field ambulance tents, and the tents brought from France and Egypt were unsuitable for the country. Large numbers of general service tents of Indian pattern had to be used and these did not provide sufficient protection from the sun in Mesopotamia during the summer. Towards the end of the period matters greatly improved. Sickness decreased, evacuation of casualties was regular and reinforcements arrived to take their place.

On the 15th November 1916 the Tigris Corps, which had been renamed the IIIrd Indian Army Corps, was divided into two corps of two divisions each, and at a later date a separate cavalry division was formed. The Tigris Force then consisted of the Ist Indian Army Corps, composed of

the 3rd and 7th Divisions; the IIIrd Indian Army Corps, composed of the 13th and 14th Divisions; and the 6th and 7th Cavalry Brigades.

The Lines of Communication.

During the month of July 1916, the Inspector-General of Communications took over control of the line up to Shaikh Saad which it was decided to organize as an advanced base, and the following changes in the system of medical administration then took place: a D.D.M.S. on the L. of C., Brevet-Colonel M. H. G. Fell, R.A.M.C., and a D.A.D.M.S. were appointed and were located at the base; an A.D.M.S., Lieut.-Colonel Goodbody, I.M.S., with a D.A.D.M.S., was appointed for the advanced base, which at this period was limited to the immediate defended area of Shaikh Saad; the office of the A.D.M.S., L. of C., at Amara became the office of the A.D.M.S., Amara area, which included the L. of C. defence posts from Ali Gharbi to Qurna inclusive; the area of the A.D.M.S. Base was extended to include the defence posts on the Shatt-al-Arab south of Qurna. Towards the end of August it was decided to establish a system of marching posts at intervals of 10 to 14 miles along the road between Qurna and Shaikh Saad and for this and other reasons the I.G.C. decided to rearrange again the administrative areas of responsibility on the L. of C. The administrative sections of the L. of C. were defined and were increased to four in number. The new L. of C. area had its headquarters at Qurna and included the Euphrates section up to Chabaish and Fort Lake, which was the transhipping station for reinforcements and stores sent up to Nasiriya by bellum across the Hamar Lake.

The Amara administrative area was correspondingly reduced when a D.A.D.M.S. directly under the D.D.M.S. L. of C. was appointed for the Qurna section. This change was necessary owing to the large amount of labour employed in the area on the construction of the railway between Qurna and Amara, work on which commenced in August 1916. The advanced base administrative area was increased to include River Head and Arab Village and the area of railway construction up to Atab on the Hai.

During the period from April to November 1916 the casualty clearing stations gradually became the filter through which all battle casualties or sick were passed before being transferred down the lines of communication. The general system which had been adopted in the previous year of developing Amara and

Basra as the two main hospital centres was adhered to. At first the whole working of the medical arrangements on the lines of communication was simplified by massing all available casualty clearing stations at Shaikh Saad. As soon as transport became available a British stationary hospital was sent up the line and opened at Shaikh Saad to take British cases from the casualty clearing stations and diminish the number of cases being sent down river. An Indian stationary hospital was also opened and expanded at Shaikh Saad. By the middle

Military railway bridge at Qurna.

of August the casualty clearing stations and stationary hospitals at Shaikh Saad could accommodate 500 British and 1,000 Indians in tents.

At Amara the hospitals, which were in buildings for the most part on the left bank and for which hutting was gradually being provided on the right bank, could accommodate 2,500 British and 3,000 Indians with adequate convalescent depôt accommodation for 750 British and 750 Indians.

At Basra the difficulties of hospital expansion were especially great owing to the lack of ground above flood level on which to build hospitals and, in the early part of the period, to the impossibility of supplying water to hospitals established on

the desert at a distance from the river. The actual available accommodation by the middle of August 1916 was about the same as that at Amara. It had not been found practicable to open convalescent depôts near the Shatt-al-Arab as the summer climate was thought unsuitable, especially for British patients ; also because a site which would not be under water during the flood season and which was at the same time accessible to a water supply was not available.

As the floods subsided and the weather began to cool, the rate of progress in establishing hospitals greatly increased. Transport facilities for up-river traffic were improving, material and labour at the base were becoming more plentiful and developments of all kinds, facilitating action, were taking place. By the end of November the accommodation at Shaikh Saad had increased to some 1,000 British and 1,500 Indian beds, with a small convalescent depôt of 500. At Amara the British accommodation remained the same, but that for Indians had increased to 3,500, whilst at Basra the British accommodation had reached 3,000 and the Indian 5,000. Both at Amara and at the base isolation hospitals had been opened and at the latter place arrangements had been made for a separate hospital for 100 officers. Convalescent depôts in tents to accommodate 1,000 British and 1,000 Indians had been opened at Mohammera, on the Persian side of the Shatt-al-Arab.

The early history of Amara as a hospital centre was one of make-shifts with an ever existing shortage of personnel and material, but during 1916 more material became available and the accommodation improved in every way. In March 1916 the hospital accommodation was distributed as follows :— British, 333 beds in houses, 360 in huts and 1,242 in tents ; Indian, 920 in houses, 400 in huts and 2,570 in tents. At that time the trained personnel in all hospitals was deficient of one half of its establishment. Patients who had been passed permanently unfit for duty and also convalescent patients were employed to enable the work to be carried on. During this period ice was available in small quantities and hand pulled punkhas were provided for most of the wards for British troops. An electric plant was installed on the left bank of the river and the hospitals were lighted in August and some fans were also provided. The sanitary sections belonging to the divisions of the corps were used at the beginning of the period, but they were replaced by No. 17 Sanitary Section from India and No. 100 British Sanitary Section (T.F.) these units having arrived in April and October. Thresh disinfectors were

provided for each hospital and No. 17 Sanitary Section opened a disinfecting station in April. In the early days water was drawn direct from the river or Jahala Canal and purified in a more or less imperfect way until August when the bleaching powder method became universal. Wells were sunk close to the river or canal bank and filled by percolation. The water in the wells was so clear that it did not require sedimentation and could be pumped straight into tanks. The conservancy system developed along the lines of an Indian cantonment system.

The Basra Base.

At Basra, during February 1916, general improvements were carried out. Units were overhauled and expanded, but the weather conditions and lack of material and personnel were a great handicap in effecting all that was necessary. There had been much sickness from the enteric group diseases and relapsing fever amongst troops arriving early in the year. There were cases of smallpox, measles and scarlet fever reported from different transports. Suspicious cases of plague were reported from the H.T. "Nile." The chief difficulty with regard to these infectious cases, more especially of enteric group diseases and relapsing fever, was not the actual treatment of the cases, although the lack of a properly equipped isolation hospital was much felt, but the labour involved in treating the clothing and kits of many men with a single Thresh disinfector. The old Turkish naval hospital at Basra had been used previously as an isolation hospital and was equipped for British and Indian patients, but it had been closed down by the direct orders of the Army Commander, and handed over to the naval authorities notwithstanding protests from the responsible medical authorities. Work on another isolation hospital was commenced half a mile lower down on the left bank, but was never completed.

In March 1916 recommendations for the establishment of a properly equipped infectious hospital were urgently made, and at the beginning of April the first steps to institute such a hospital were taken. Meanwhile relapsing fever had broken out amongst the Turkish prisoners. Vigorous action was taken, and an officer, Captain Hibbert, I.M.S., was detailed to take medical charge of the prisoners of war camp at Tanumah. Unfortunately, he contracted the disease and died on 19th March. Both at the prisoners' camp and at the Mission hospital, where the sick and wounded Turkish prisoners were

treated, many deaths occurred. In addition to relapsing fever typhus fever broke out. Cases of cholera also occurred during April. A section of No. 137 Indian Field Ambulance was sent to the Mission hospital and another section to Tanumah. Accommodation at both places was increased and eventually these units were well equipped with beds, mattresses, pillows, blankets, mosquito nets, and other necessary equipment. Hospital clothing, with overalls and blouses for the staff and for Turkish doctors who had been taken prisoner and were assisting the British medical officers, was also provided.

In April 1916 the first nursing sisters belonging to the Q.A.I.M.N.S. arrived in Mesopotamia. Hitherto all nursing sisters, numbering about twenty-five, had belonged to the Q.A.M.N.S. for India. There was some difficulty at first in accommodating these ladies as very short notice of their arrival in the country had been given.

By July 1916 forty-five nursing sisters had arrived and were quartered at No. 3 British General Hospital. Miss B. Jones, Q.A.I.M.N.S., was appointed principal matron.

During April a commission, the Vincent-Bingley Commission, arrived, to enquire into the breakdown of the medical services.*

The sanitary arrangements at Basra base were reorganized ; and with the growing demand for improved sanitation the work of No. 10 Sanitary Section, the only sanitary section at the base, was greatly increased. This unit had to supervise all the sanitary improvements, supply extra sweeper personnel for the river convoy boats, make preparations for the arrival of the new divisions from France and Gallipoli, and attend to the many details associated with measures adopted for preventing the spread of the infectious diseases which the 13th Division had brought with it to Mesopotamia. The number of sweepers which had been attached to this sanitary section was 200. The number required by the officer-in-charge was 370. It was impossible to get Arab labour for general sanitary work, so the task of providing proper sanitary personnel at Basra base was not a light one. The difficulties of organizing a sufficient number of slaughter houses and all the other details of cantonment sanitation were many.

* The Vincent-Bingley Commission was appointed by the Government of India. Its members were Sir W. Vincent, I.C.S., Major-General Bingley, and Mr. E. A. Ridsdale. They submitted a report on 29th June 1916, which condemned generally the medical arrangements.

The number of British sick and wounded admitted to the general hospital at Basra from 1st January to the end of April 1916 was 8,563, as follows :—

	Sick.	*Wounded.*
January	816	1,186
February	422	159
March	1,058	563
April	1,396	2,963
Totals ..	3,692	4,871

Of these, 3,850 were direct admissions and the remainder were from other hospitals up country. The incidence of some of the principal diseases during the period was :—

Disease.	January.	February.	March.	April.	Total.
Malaria ..	59	75	56	113	303
Dysentery ..	72	13	25	140	250
Venereal disease	27	19	36	20	102
Enteric group ..	7	12	39	43	101
Relapsing fever	—	1	60	—	61
Beri-beri ..	10	3	—	—	13

Practically all wounded men were invalided to India, irrespective of the seriousness of the wound inflicted. A high percentage of the sick was also treated in the same way, as is shown in the following tables.

British Wounded.

	Wounded.	*Invalided.*	*Percentage.*
January	1,293	1,153	89·2
February	175	152	86·8
March	620	577	93·1
April	3,209	3,149	98·1
Totals ..	5,297	5,031	94·0

British Sick.

	Sick.	*Invalided.*	*Percentage.*
January	855	582	68·0
February	462	265	57·0
March	1,133	770	69·0
April	1,525	1,039	68·0
Totals ..	3,975	2,656	65·5

The total Indian casualties, including followers treated at Basra, for the same period were :—

	Sick.	*Wounded.*
January	2,560	2,800
February	2,516	570
March	3,571	1,087
April	4,279	2,222
Totals ..	12,926	6,679

Of the sick, 4,887 were direct admissions from the base during the first three months. The incidence of the principal diseases among Indians was :—

Disease.	January.	February.	March.	April.	Total.
Dysentery ..	345	432	395	356	1,528
Malaria ..	176	143	192	201	712
Venereal disease	69	103	112	97	381
Scurvy	17	3	96	126	242
Relapsing fever	—	—	8	5	13
Enteric group ..	2	—	3	3	8

The invaliding figures were :—

	Sick.	*Invalided.*	*Percentage.*
January	2,560	1,490	58·0
February	2,516	1,623	64·5
March	3,571	2 420	68·0
April	4,279	1,938	45·0
Totals ..	12,926	7,471	58·0

	Wounded.	*Invalided.*	*Percentage.*
January	2,800	2,296	82·0
February	570	316	55·0
March	1,087	755	69·5
April	2,222	1,402	63·0
Totals ..	6,679	4,769	71·0

The total thus evacuated to India for the period January to April 1916 was 7,687 British and 12,240 Indians, making a grand total of 19,927.

With the termination of active hostilities after the fall of Kut few wounded came down the line, and during this quiescent period Basra became a busy centre of reorganization in preparation for a future advance. The main object of this organization as regards the medical service was the prevention of disease. Methods for the isolation of infectious diseases and

their contacts were perfected, a laboratory at the new isolation hospital was opened, the hospitals were developed and an improved sanitary organization was instituted. Large reinforcements of R.A.M.C. arrived from England and the field units were gradually sent up stream. Preparations were made for the new general hospitals that were expected and a large house about four miles down the river was opened as an officers' hospital at Bait Naama on 26th July and became one of the most efficient institutions in the country.

Troops were still arriving without mosquito nets and helmets and these had to be supplied. Lectures and circulars on the preservation of health in the tropics were given to all new arrivals. Drinking water posts were opened and all mineral water factories and ice factories opened by the civil inhabitants were brought under control. Some were closed, others were put under supervision. The supply of ice at the beginning of the period was very deficient, and it remained so. The maximum quantity of ice allowed for the medical needs of the base was $2\frac{1}{4}$ tons daily. Estimates had been forwarded in December 1915 stating the requirements of the hospitals. Ice machines capable of producing six tons of ice daily began to arrive from India about the end of May and the beginning of June. Before these new machines were installed the existing ice supply broke down when the weather was hottest, owing to the staff of the ice factory suffering from heat stroke.

The installation of electric fans progressed slowly. The hospitals that had been open at Basra for some time were equipped with them, but no provision had been made for the new hospitals and hutments which were springing up over all the area. Supplies took some time to reach Basra, and without definite knowledge of the number of troops arriving it was impossible to make satisfactory arrangements. Twelve heat stroke stations were opened in different localities and a medical officer in each district was responsible for the respective stations. Each station was provided with a bath, cold water and ice, ice cap, enema syringe, thermometer and the necessary materials for giving hypodermic injections of quinine. Arrangements were made for transferring patients from the heat-stroke station to hospital after sundown.

The arrangements for dentistry were unsatisfactory. On the 4th May 1916, two Government dental surgeons arrived, one of whom was sent to Amara and the other to Basra. The latter had offices allotted to him and he commenced work on the 11th of the month.

The sick rate amongst the fresh reinforcements arriving at Basra was very high. Numbers of troops went straight into hospital on arrival and were invalided back to India without taking any part in the campaign. To overcome this as far as possible disembarkation was effected late in the day* and at each of the landing places two motor ambulance cars in charge of a medical officer with a supply of chlorinated water were stationed. The ambulance cars followed in the rear of the marching column to pick up the stragglers. At the same time urgent representations were made concerning the arrival of men without helmets, sun-glasses, mosquito nets and other articles of equipment so essential in Mesopotamia. Early in July 1916 a special committee investigated the question of the class of recruits then being sent from England. They arrived at the following conclusions : Young men under twenty and old men were unsuitable for campaigning in Mesopotamia and should not be sent out. The committee also recommended that all drafts should be acclimatized in India before being sent on to Mesopotamia.

The arrival of a large batch of medical reinforcements in May 1916 demonstrated the undesirability of attaching medical reinforcements to the general hospitals pending distribution to units. It was therefore decided to open a medical reinforcement camp. At first this camp was not well organized and was the subject of much criticism, but a beginning had been made and with it another defect of the earlier medical arrangements was rectified. The camp gradually developed and became the combined British and Indian medical base depôt. It was ultimately organized on sound lines and served a most useful purpose.

During July 1916 there was much sickness amongst the medical staff, and some units lost nearly half their personnel. The hospitals, moreover, were full to overflowing. The maximum number of local British sick admitted to the base hospitals occurred during the week 6th-12th July, when a total of 1,114 was recorded. The number of Indians admitted weekly varied from 1,800 to 2,000. Casualties amongst drafts proceeding up-river during this month were so heavy that the Inspector-General of Communications considered it best to postpone further departures until a later date.

By the middle of the year the construction of the Basra-Nasiriya railway had been commenced. The 41st Brigade,

* There was no embarkation medical officer until after the arrival of the divisions from France.

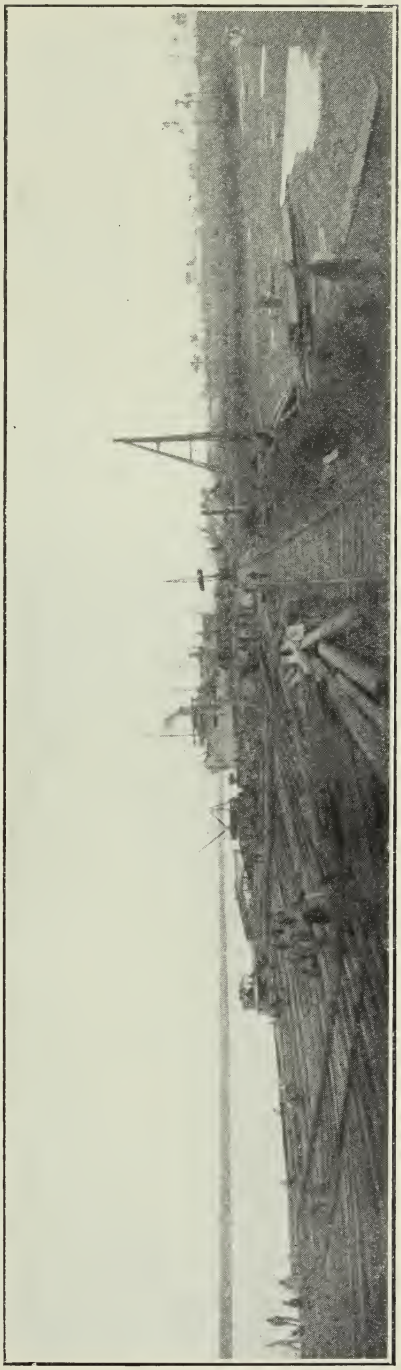
which was at Makina Camp, was sent out for its defence against hostile Arab attacks. With it went No. 24 Combined Field Ambulance, which opened at Shaiba. The sick were evacuated at nightfall by motor transport to Basra. Medical arrangements were made for the other out-lying posts, such as Fao and Gurmut Ali. In order to open the channel across the Hamar Lake a dredger had commenced operations in the hope that a light draft steamer might attempt the journey during the low water season and evacuate cases from Nasiriya.

The hospital establishments were revised. British general hospitals from India were gradually staffed by nursing sisters on a scale similar to that in France. The addition of R.A.M.C. orderlies, however, rendered the number of assistant surgeons and menial Indian personnel excessive ; the former were consequently detailed to field ambulances or placed in medical charge of small units, while the latter were sent to the general hospitals arriving from England which had no menial Indian personnel.

Within the first fortnight of September over 100 medical officers and 800 trained orderlies had been added to the strength of the force, but there was still a considerable shortage of Indian personnel. This was keenly felt at the hospitals, and was aggravated by the poor and unsuitable type of men frequently supplied as reinforcements. Some of the so-called cooks had never cooked before, and scarcely one of the dhobies had previously done washing work. The sending of unsuitable men caused much inconvenience and unnecessary expense, and at a later date it formed the subject of an enquiry.

From September 1916 onwards the dominant feature at the base was the growth of the labour corps. By September the military population at Basra alone numbered 40,000, to which had been added the ever-increasing numbers of men of the labour corps. By the end of that month about ten Indian and one Egyptian labour corps had arrived in the country. The administration of all matters connected with river craft, dockyards and internal waterways was placed in the hands of the Inland Water Transport. As a result of the change, large numbers of Lascars, dock labourers and craftsmen, skilled in work of this nature, began to pour into the base, and at that time there seemed to be no end to the number that might still be wanted in view of the developments contemplated. New dockyards were being excavated, the work on the Magil wharfs employed thousands, and between Magil and Gurmut Ali extensive works were in progress. The responsibility of making

adequate arrangements connected with the prevention of disease and with the housing of all these labour corps and additional formations presented many problems to the medical service. The men of the labour corps had no knowledge of camp sanitation. They were undisciplined and the mechanism for imposing authority in sanitary matters was ill-developed. In the case of some labour corps and railway workers the officers were concerned solely with the execution of the task in hand, and such side issues as the accumulation of filth and the multiplication of flies did not concern them. In framing measures for improving the sanitation of labour camps, the exhibition of tact and a clear grasp of what were essentially practical requirements as opposed to unattainable ideals were demanded. In the case of all these camps time was necessary for obtaining good conservancy. Each camp was provided with a sweeper detachment, but so rapid was the influx of men that sufficient sweepers could not with



Construction of the new port of Basra at Magil.

any degree of certainty be obtained. To most of the labour camps an assistant or sub-assistant surgeon was attached. He attended to the minor ailments and supervised the sanitation of the camp. In certain areas dispensaries for the treatment of the local sick from the labour corps in the area were available.

Special departments and hospitals were opened, such as ophthalmic departments and a venereal hospital. A British convalescent depôt was established at Mohammera. This depôt received the first batch of 100 convalescents on 24th October 1916, and, as it had been decided to abandon Ashar barracks as a convalescent depôt, it was extended to accommodate greater numbers. The site of the new camp on the right bank

British Convalescent Depôt, Mohammera.

of the river, about three miles above the Persian town of Mohammera, was ideal. It had a pleasant outlook on the river and on the Bamashia channel leading from it. Steep turf banks and scattered palms gave to the camp a rural appearance, enhanced by well-made gravel paths, rustic seats, fences and flower-beds. Patients were conveyed to and from it by river boats twice weekly. During November 1916 a similar convalescent depôt was opened for Indians on an adjoining site.

On 24th October 1916, Nos. 46 and 99 British Sanitary Sections arrived in Basra and the process of organizing sanitary areas under area sanitary officers was begun. Three sanitary sections, Nos. 27, 29 and 10, were allotted respectively to the sanitary areas of Ashar, Makina and Magil. Of the two newly arrived sections, No. 46 was organized as a school of instruction and No. 99 was disbanded, its personnel being distributed as inspectors to Nos. 27, 29 and 10 Sanitary Sections. Establishments for them were drawn up and consisted of one assistant

or sub-assistant surgeon, 10 British orderlies, 13 Indian orderlies and 100 sweepers. With the areas under efficient sanitary organizers and well-equipped units the sanitary arrangements rapidly improved. The principal improvement was the construction of a pipe water supply for distributing water all over the base.

A scheme of laboratory organization was prepared and resulted in the establishment of new bacteriological laboratories at the base and the improvement of those already existing at the end of May 1916. A central laboratory was established in a house in Basra city under the personal direction of Major Christophers, I.M.S. The staff consisted of specialist officers having expert knowledge of various subjects. These experts were to act as advisers to the D.M.S. through Lieut.-Colonel James, I.M.S., the A.D.M.S., Sanitation. Major Christophers was malaria expert, Major Kunhardt, I.M.S., plague specialist, Captain Morrison, I.M.S., water supply specialist; Lieutenant Boulenger, protozoologist, Lieutenant Grove, entomologist; and Lieutenant Bassett, chemical examiner. In addition to its scientific uses it was proposed that the central laboratory should keep in touch with hospital laboratories, noting their requirements, and also assist in drawing up estimates for the replenishment of laboratory supplies. During the greater part of 1916 the supply of all laboratory material was scarce and, pending the arrival of consignments from England, the central laboratory frequently helped to tide over temporary shortages by making grants from its own resources.

The statistics given in the tables on following pages show the number of local admissions to hospitals in Basra during the hot weather between May and November 1916. They are practically complete with the exception of those from the isolation hospital, for which admission registers were imperfect during the early part of the year, and from No. 25 Indian General Hospital, which was only open to the extent of about 100 beds during the last fortnight of the period.

The conditions which had existed under Surg.-General Hathaway's administration in 1915 and the earlier part of 1916, together with the heavy casualties both from wounds and sickness occurring at that time, had thrown a severe strain on the medical resources of the force, and at times had produced a situation which could not be dealt with effectively.

In contrast with that state of affairs the reorganization brought about by Surg.-General Treherne and Brevet-Colonel M. H. G. Fell, after their arrival in May 1916, presents a picture of steady continuous progress at the base and throughout the force.

Local admissions to base hospitals, 1st May–30th November 1916. British officers and other ranks.

	May.		June.		July.		August.		September.		October.		November.	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Malaria	131	14·5	781	29·4	691	24·6	426	18·1	304	12·8	360	20·8	288	21·7
Enterica	19	2·1	66	2·5	87	3·0	128	5·4	139	5·8	100	5·8	37	2·8
Effects of heat ..	113	12·6	404	15·2	631	22·1	127	5·4	42	1·8	5	0·28	3	0·22
Jaundice	45	5·0	190	7·1	96	3·3	95	4·0	59	2·5	59	3·4	67	5·0
Cholera	2	0·2	14	0·52	21	0·74	16	0·68	11	0·5	9	0·5	2	0·15
Dysentery ..	23		65		141		200		127		89		105	
Diarrhœa ..	85		163		161		133		99		80		84	
Colitis	67	20·0	54	11·7	33	13·4	82	19·9	48	14·6	20	15·0	16	23·4
Enteritis	6		30		47		53		70		69		107	
Sandfly fever ..	—	—	11	0·4	19	0·6	305	13·0	799	33·8	360	20·8	85	6·39
Venereal disease ..	17	2·0	20	0·75	56	1·9	41	1·8	29	1·2	45	2·5	41	3·15
N.Y.D. fever ..	2	0·2	3	0·1	2	—	—	—	—	—	—	—	—	—
P.U.O.	90	10·0	198	7·4	113	4·0	59	2·5	23	0·9	19	1·1	23	1·7
Miscellaneous ..	298	33·1	653	24·6	748	26·2	684	29·1	611	25·9	511	29·6	473	35·5
Totals ..	898	99·7	2,652	99·67	2,846	99·84	2,349	99·88	2,361	99·8	1,726	99·78	1,331	100·01

Local admissions to base hospitals, 1st May–30th November 1916. *Indian officers, other ranks and followers.*

	May.		June.		July.		August.		September.		October.		November.	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Malaria	274	9·5	946	15·9	1,580	26·0	1,323	32·2	1,279	33·6	1,051	25·6	786	21·2
Enterica	10	0·35	9	0·15	9	0·15	16	0·4	4	0·1	17	0·41	3	0·08
Effects of heat ..	6	0·21	4	0·06	14	0·23	3	0·07	1	—	—	—	—	—
Jaundice	38	1·3	179	3·0	196	3·2	184	4·4	97	2·5	108	2·6	217	5·8
Cholera	35	1·2	15	0·25	35	0·59	45	1·2	15	0·4	48	1·1	4	0·1
Dysentery ..	352		360		317		327		319		443		456	
Diarrhoea ..	226		482		471		407		338		254		215	
Colitis	86	24·7	201	17·7	166	15·9	47	19·0	27	18·0	63	18·6	120	24·0
Enteritis	3		10		3		3		2		4		—	
Venereal disease ..	69	2·4	120	2·0	94	1·5	128	3·6	148	3·9	169	4·1	144	3·9
P.U.O.	173	6·0	1,583	26·6	633	10·4	186	4·4	15	0·4	53	1·2	46	1·2
Scurvy	7	0·24	62	1·1	121	2·0	130	3·6	34	0·9	34	0·8	35	0·9
Mumps	25	0·85	18	0·3	10	0·16	17	0·4	6	0·15	4	0·1	11	0·3
Miscellaneous ..	1,521	53·0	1,952	33·0	2,420	40·0	1,291	31·0	1,519	39·6	1,854	45·0	1,687	45·3
Totals ..	2,825	99·75	5,941	100·06	6,069	100·13	4,107	100·27	3,804	99·55	4,102	99·51	3,724	102·78

Invaliding was high during the whole of the hot weather. The following table gives the figures and percentages invalided for local admissions only during the period of hot weather from May to November 1916.

	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
British Troops—							
Admissions	898	2,652	2,846	2,349	2,361	1,726	1,331
Invalided	322	909	1,222	1,180	689	335	275
Percentage	25·8	38·0	42·9	50·0	29·5	19·4	20·6
Indian Troops—							
Admissions	2,825	5,941	6,069	4,107	3,804	4,102	3,724
Invalided	1,237	3,150	3,360	2,174	1,556	1,116	1,158
Percentage	43·1	52·9	55·3	53·0	40·9	27·2	31·09

Cases transferred from up river were very numerous, and provided a higher percentage of invaliding. The following tabular statement gives the totals of such cases month by month during the hot weather :—

British sick evacuated to Basra during the hot months of 1916.

	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
Malaria	199	220	473	246	166	204	78
Enterica	153	444	513	388	256	404	342
Effects of heat	104	120	411	154	132	27	—
Jaundice	81	457	552	129	55	46	39
Cholera	5	—	3	1	—	10	13
Dysentery ..							
Diarrhœa ..	848	925	755	232	384	350	338
Colitis							
Enteritis ..							
Sandfly fever	—	4	35	17	98	64	10
Venereal disease ..	13	24	11	8	5	19	4
Beri-beri	15	2	2	1	16	8	19
P.U.O.	172	221	279	108	110	38	22
Miscellaneous	760	976	1,634	639	620	550	386
Totals ..	2,350	3,393	4,668	1,923	1,842	1,720	1,251
Invalided ..	2,120	2,869	3,208	1,497	1,081	909	696

Indian sick evacuated to Basra during the hot months of 1916.

	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
Malaria	176	413	250	234	169	254	211
Enterica	12	40	17	30	39	83	55
Jaundice	60	349	360	246	65	122	118
Cholera	—	—	—	—	2	—	1
Dysentery ..							
Diarrhœa ..	447	614	303	225	224	317	129
Colitis							
Enteritis ..							
Venereal disease ..	84	99	51	47	60	115	10
Scurvy*	50	115	248	759	881	1,556	564
P.U.O.	50	198	111	53	30	32	35
Mumps	23	14	2	3	—	—	—
Relapsing fever	—	1	—	—	—	1	—
Miscellaneous	2,306	3,055	2,140	4,403	2,570	3,074	1,539
Totals ..	3,208	4,898	3,482	6,000	4,040	5,554	2,662
Invalided ..	2,841	4,675	3,087	5,710	3,721	4,758	2,090

Evacuation by River and Sea.

The state of the river boat service during January and February 1916 has already been described. In March only one or two additions were made to the fleet, noteworthy among them being "S.1" and "S.2," two large stern paddle boats. At the end of February five steamers were staffed from units at the base and provided with medical stores and equipment for 500 patients.† They were ordered to proceed up river with troops and stores and to bring down sick convoys on the return journey. When they arrived at the front the stores were unloaded and the personnel employed for local duty with field medical units until such time as their services were required for convoy work. When a convoy of sick and wounded was ready for despatch, which might happen in two or three days or after longer periods, the personnel, stores and equipment were collected, rations were procured and steamers prepared for the patients. These river boats were a great

* Figures for scurvy do not include admissions to Nos. 9 and 10 Indian General Hospitals between the months of May and October inclusive.

† These steamers and the "P" class were ordinary transports used for carrying troops and stores upstream. They had no Red Cross distinguishing marks. When the number of Red Cross river craft was greatly increased, the advisability of reserving special craft for the evacuation of sick and wounded was everywhere discussed. Apart from all criticism of their design, the objections raised were: (1) The Arabs had no regard for the Geneva Convention and found it safer to fire on a vessel marked by a Red Cross. (2) It was more economical to have "ambulance transports," *i.e.*, vessels which could be used for transporting men, stores and food up-river, and for evacuating sick and wounded on the down trip.

improvement on anything that had been organized previously. The first four left Basra on 28th February 1916, followed by the fifth shortly afterwards, and a sixth at the beginning of April. Efforts were also made to improve conditions in some of the other boats by placing on board a supply of medicines, dressings and medical comforts for use on the downward journey, should no organized medical units be on board. In April many new paddle boats made their appearance in addition to the original seven. These new boats were numbered "P.8" to "P.24." All of them were used for bringing sick and wounded down stream.

Slight improvements connected with general sailing arrangements were carried out in many ways. Many ships were without water tanks and these were gradually supplied. Water sterilization was still imperfect or not attempted at all and troops upward bound frequently drank river water without sterilizing it, while sick and wounded coming down were dependent upon whatever method of purification the medical officer had been able to carry out. The crew usually did as they pleased—a most unsuitable state of affairs, as the latrines occupied a forward position and water was usually drawn from the after part of the ship. The supply of bedding on board the steamers was often unsatisfactory, mattresses stuffed with chaff or a few stretchers being sometimes all that was available. Protection from sun and rain was scanty and many of the barges employed for carrying sick and wounded were devoid of any covering. Facilities for cooking were also limited.

The first hospital river boat, the "Sikkim," arrived in Mesopotamia at the end of February 1916. Personnel from No. 20 C.C.S. was detailed to staff it. Its appearance led to improvements being made in other vessels used for evacuating casualties.

Fatigue parties, consisting of fifty British and fifteen Indians from the base depôts, acted as stretcher squads for unloading patients from the river boats, and relieved the hospital staff from this duty. New piers were built, so that river boats and hospital ships could be berthed alongside, thus simplifying the disembarkation of the patients.

The organization of a unit dealing solely with sick convoy work on the river was now developing. A system was gradually evolved for supplying the river craft, used for medical convoy work, with drugs and medical comforts for the journey. For this purpose a small store was established at Bait Mur, where a couple of Thresh disinfectors for disinfecting blankets was

also available. Five medical units for sick convoy work were obtained from the hospitals at the base. Personnel and equipment for additional boats used in evacuating casualties had still to be found from front-line units. But on 9th June 1916 twenty-one officers of the Royal Army Medical Corps and three officers of the Indian Medical Service arrived to form the nucleus of a unit, which was designated the River Sick Convoy Unit. The organization of the new unit was entrusted to Major Beauchamp Williams, I.M.S., who proceeded up river during the course of the next few days and established his headquarters at Shaikh Saad. The improvised river medical units were no longer required and ceased to exist. At first the River Sick Convoy

River craft of the paddle steamer type on the Tigris.

Unit was unrepresented at Basra, but at the end of September an officer was appointed for river embarkation duties. On 15th October, Major Williams returned to Basra and established the headquarters of the unit at Bait Mur, but he subsequently obtained a new block of huts known as the Robat block of Nos. 9 and 10 Indian General Hospitals. The disinfection work of the River Sick Convoy Unit was performed by No. 10 Sanitary Section. The number of steamers taken up for sick was limited to the best class of vessel only and the sick were only embarked on the best type of barge. The supply at Amara of fresh bread, meat, eggs, fruit and vegetables to the sick convoy boats passing through was systematized. At that time no such commodities were obtainable at Shaikh Saad. Convoys, as a rule, took about a day and a half to reach Amara and two days between Amara and the base.

On the whole, this system worked fairly well considering the shortage of personnel, stores and equipment. Until the middle of September 1916 the overcrowding of the field medical units in the corps area could not, however, be effectively relieved. The actual numbers of sick sent down river from the divisions of the corps to Basra during the six months from June to November 1916 were 927 British officers, 12,747 British other ranks, and 24,525 Indian other ranks and followers. About the middle of August 1916, when greater facilities existed for obtaining supplies, equipment and personnel for the River Sick Convoy Unit, the conditions under which the sick were brought from the front began to show a very marked improvement as regards comfort. But the arrival of new types of paddle steamers, known as the " 50 " class, and the construction of the new types of barge marked the greatest change. The good head cover, open deck spaces, improved latrines, cooking and water arrangements of these boats were far superior to any of the vessels then on the river. Each steamer was provided with a permanent convoy party and carried medical comforts, dressings, stores and equipment for the care of convoys to the number of 500 either mixed or entirely British or entirely Indian. Permanent deck space was allotted for the convoy personnel of the steamer. A dispensary was erected on the deck, and it was decided as soon as operations commenced to add two nursing sisters to each steamer for duty with the convoy party.

The transfer of cases from Basra base to India also presented many difficult problems. It has already been noted that in the month of June 1916 the rapid rise in the sick rate made it very evident that the existing hospital accommodation at Basra was totally inadequate to meet the rush of sick transfers from up river in addition to dealing with the very heavy local admission rate at Basra itself. The pressure on hospitals was so great that forced evacuation became necessary, there being neither the space, time, beds, nor medical personnel to deal with the influx of cases requiring treatment with any degree of discrimination. Transports for the lighter cases, more especially for Indian sick, were taken up, staffed and equipped for their transfer to India, the number of hospital ships using the port being unable to cope with the stream of Indians. Owing to the strain on the medical personnel ashore very few trained personnel could be spared for the sick on these transports. This was regrettable because a certain proportion were more suited for evacuation on hospital ships than on the hired transports.

The actual numbers sent to India by hospital ship and by hired transport during the months June to November 1916 inclusive were as follows* :—

Month.	Transfer by hospital ship.			Transfer by hired transport.			Total.		
	Offrs.	Other ranks.		Offrs.	Other ranks.		Offrs.	Other ranks.	
		Brit.	Ind.		Brit.	Ind.		Brit.	Ind.
June ..	243	2,178	2,274	104	1,211	4,638	347	3,389	6,912
July ..	310	3,780	2,625	70	1,367	4,239	380	5,147	6,864
August ..	183	3,312	5,983	2	200	1,284	185	3,512	7,267
September	195	2,754	7,583	—	—	—	195	2,754	7,583
October..	160	1,559	5,317	—	—	—	160	1,559	5,317
November	112	754	4,467	—	—	—	112	754	4,467

The conditions then in connexion with embarkation duties were severe and arduous. The shortage of personnel, of launches, of stretchers and transport of all kinds, and the exhaustion through heat and fatigue of the bearer parties themselves were the consequences of previous lack of foresight and proper organization.

The hospital ships which came into Basra or to which sick were transferred at the bar during the month of June, were the "Cecilia," "Syria," "Vita," "Varsova," "Varela," "Loyalty," "Devanha" and "Takada." These were increased during the following months by the "Ellora," "Assaye," "Dongola" and the "Madras" which had been to East Africa and were again on the Basra-Bombay run. In August the "Nevasa," "Oxfordshire," "Erinpura" and "Egypt" were added and an order was issued to the effect that no sick were to be transferred to India except by hospital ship.

Complaints had been made to the Home Government regarding the class of case transferred by transport to India, and the shortage of personnel and stores provided for the care and comfort of the sick on the journey. It is quite evident that such complaints were justified by facts, but, considering the conditions prevailing, they were not the result of the bad administration of the medical service in Mesopotamia at that time, but rather part of the legacy of the previous 19 months of war. Comment was also made on occurrences during the transhipping of patients at the bar to the deeper draft ships, which were unable to come up the

* Many of these cases had been admitted to hospital and invalided during previous months.

Shatt-al-Arab. This was especially emphasized by what happened in the case of H.S. " Vita " in the third week of July when transhipping patients to the " Dongola " at the bar on a very hot day. A number of cases of heat stroke occurred while the ships lay alongside each other. The transfer of the patients was slow and several of the orderlies engaged in the duty were struck down by heat stroke.

The hospital ships were under the administration of the D.M.S. in India and not under the D.M.S. of the Mesopotamia Expeditionary Force and all requests to army headquarters in India relating to changes in the number of sailings and other alterations were wired to Simla. As soon as the pressure on hospital accommodation at the base was relieved, and as the weather became cooler, there was a marked diminution in the British invaliding rate, but the Indian rate kept high well on into the late autumn, owing to the large number of severe cases of scurvy which it was necessary to send to India.

CHAPTER XI.

THE OPERATIONS LEADING TO THE OCCUPATION OF BAGHDAD IN 1917.

LIEUT.-GENERAL Sir Stanley Maude assumed command of the army on 28th August 1916, in succession to Lieut.-General Sir Percy Lake. The responsibilities of the army in Mesopotamia then extended over a wide area, embracing positions on the Tigris, Nasiriya on the Euphrates, Bushire on the Persian Gulf and Isfahan in Persia.

The latter months of 1916 had been spent in improving the health and training of the troops, who had suffered severely from the intense heat during the summer months, improving the lines of communication, developing the resources of the force and amassing supplies, ammunition and stores at the front. General Headquarters remained at Basra till the end of October. The subsidence of the floods and the organization of local and imported labour had removed obstacles which had hitherto hindered development. The Directorate of Inland Water Transport had been created and additions of men and material had arrived from overseas as well as additional river craft. The arrival of adequate and experienced personnel for the Directorates of Port Administration, Conservancy Works and Railways and the supply of transport and ordnance stores enabled the different departments to cope with their responsibilities in maintaining the field army. Hospital accommodation had been reviewed and expanded, and the remount and veterinary services had been overhauled and reconstituted. Changes had also been made in the organization of the army; the grouping of formations and units was adjusted and alterations were made in the system of command. The scheme of defence for the lines of communication had been recast and additional lines of communication units for administrative purposes had been provided. Establishments for all units, whether on the various fronts or on the lines of communication, had been fixed, whilst the provision of mechanical transport and an increase in animals and vehicles enabled the land transport with the force to be reconstituted. By the end of November 1916 preliminary preparations for an advance were well organized. A steady stream of reinforcements had been moving up the Tigris for

weeks and drafts were joining their units, making good the wastage of the summer. The troops had shaken off the ill-effects of the hot weather and their war training had improved.

At the beginning of December 1916 the Turkish forces still occupied the same positions on the Tigris front which they had occupied during the summer. On the left bank of the Tigris they held the Sanna-i-Yat position where they had withstood the British attacks on three occasions during the previous spring, and since then had strengthened and elaborated their trench system and a series of successive positions which extended back for fifteen miles to Kut. The river bank from Sanna-i-Yat to Kut was also entrenched. On the right bank of the Tigris the enemy's line extended from a point three miles north-east of Kut in a south-westerly direction across the Khadairi bend to the River Hai two miles below its exit from the Tigris and thence across the Hai to the south-west. The British trenches were within 120 yards of the Turkish front line at Sanna-i-Yat. On the right bank the troops were established some eleven miles upstream from Sanna-i-Yat with advanced posts about two miles from those of the Turks opposite the Khadairi bend and some five miles from the enemy's position on the Hai. In the positions outlined above, desultory warfare with intermittent artillery and aerial activity had continued for some months.

On the morning of 13th December 1916 the 17th Division held the trenches in front of the Sanna-i-Yat position and the 3rd Division held a position extending on the south of the river from Sinn Banks to Arab Village. The 6th and 7th Cavalry Brigades which had just arrived, were at Arab Village on the right bank of the river. These two cavalry brigades at a later date constituted the cavalry division. The 14th Division held the Sinn position, while the 13th Division had arrived at Twin Canals to join the 14th Division. It had marched from Amara.

Medical Arrangements for the Capture of Kut.

The following medical arrangements were made for the advance. The field ambulances of the 7th Division were situated on the left bank of the river, No. 20 British Field Ambulance and Nos. 128 and 129 Indian Field Ambulances being one mile in advance of No. 19 British Field Ambulance and No. 130 Indian Field Ambulance, which were opposite Arab Village. Those of the 14th Division, Nos. 1, 20, 21, 22 and 135 Combined Field Ambulances, were close to the railway, about half a mile east of railhead. Those of the 3rd Division, three sections of No. 7 British Field Ambulance, two sections of No. 8

British Field Ambulance and No. 113 Indian Field Ambulance, were at Sinn Abtar, while two sections of No. 8 British Field Ambulance and No. 111 Indian Field Ambulance were at Twin Canals, and one section of No. 7 British Field Ambulance and No. 113 Indian Field Ambulance at the Narrows. Those of the 13th Division, Nos. 39, 40 and 41 Field Ambulances, were with their division. Those of the 6th and 7th Cavalry Brigades, Nos. 131 and 119 Cavalry Field Ambulances, were with their brigades at Arab Village.

Nos. 15, 16, 19 and 20 C.C.Ss. were at Shaikh Saad. Each was normally equipped for 200 casualties, with 50 hospital bedsteads for serious cases and 150 stretcher beds. The accommodation and number of bedsteads had, however, been gradually increased with the intention of leaving all surplus equipment behind at Shaikh Saad should it be necessary for units to advance. Each had a fully equipped operating room or tent under a surgical specialist while No. 16 C.C.S., in addition, had the steamship "H.P.1." On board it there were a well appointed operating room, an X-ray apparatus and twenty beds. Thus a complete mobile operating theatre was available. The engines, however, were defective and the vessel, if required to move, would consequently have had to be towed. Also at Shaikh Saad were No. 31 British Stationary Hospital with 400 beds, and No. 61 Indian Stationary Hospital with 600 beds. The normal accommodation at Shaikh Saad with that in the casualty clearing stations was thus 1,800 beds, but if necessary it could be readily expanded to 3,600 beds.

Two of the casualty clearing stations, No. 19 Combined and No. 16 British, were held in readiness to proceed to railhead or to Arab village as occasion required. Both were arranged to form a light and heavy echelon, the light to move first with all the essentials for the establishment of a casualty clearing station, and the heavy echelon to bring up heavy baggage, such as bedsteads, whenever transport became available.

Of the advanced depôts of medical stores, No. 5 Depôt was at Arab Village to supply the units north of the river and the cavalry field ambulances, No. 6 was at Shaikh Saad for the supply of the units of that place, and No. 7 was also at Shaikh Saad for the supply of the 3rd, 13th and 14th Divisions by means of the railway.

Two consulting surgeons had been detailed for duty at the front, Colonel Hugo, I.M.S. for the field ambulances, and Lieut.-Colonel T. P. Legg, R.A.M.C. for the units at Shaikh Saad.

Colonel Starr was detailed to represent the Director of Medical Services as D.D.M.S. at advanced G.H.Q. His duties were to co-ordinate the movements of the field medical units and keep in touch with the two corps headquarters, as well as with advanced general headquarters, and to give information to the General Staff and the Director of Medical Services regarding the movements of units and the progress of evacuation from the field ambulances. The D.M.S., whose headquarters were at Shaikh Saad, controlled the evacuation by river and rail to Shaikh Saad.

A medical officer was appointed to Ist Corps headquarters and another to IIIrd Corps headquarters to receive orders from the General Staff and act as reporting officer to the D.D.M.S. Colonel Fell, R.A.M.C., D.D.M.S. L. of C., controlled the evacuation from Shaikh Saad by river steamers to Basra, and the subsequent evacuation from Basra to India.

Medical officers, designated "entraining medical officers," were detailed for duty at the entraining stations at Twin Canals, Sinn and Shaikh Saad. Subsequently a fourth medical officer was appointed for Imam-al-Mansur when that place became railhead. These officers were responsible for the evacuation of casualties by railway. The medical officer at Twin Canals was responsible for the despatch of messages by telephone or telegraph to the A.D.M.S., Shaikh Saad, giving approximately the number of casualties, lying and sitting, British and Indian, respectively, leaving Twin Canals by train, and the approximate time at which the trains would reach Shaikh Saad.

A calculation was made as to the number of wounded that could be evacuated by train on the narrow-gauge railway, but owing to the variety of trucks, the number of trains available and the number of journeys every twenty-four hours, it was not possible to fix the number with any degree of accuracy. The number of trucks for one train was nineteen or twenty-one, of which two were required for water tanks and traffic purposes. On 14th December 1916, there were on the railway ten trucks of five tons with sides, eighty-eight trucks of three tons with sides, two trucks of three tons with no sides or ends, and twenty-six trucks of two tons for local use only. Hence there were about eighty trucks available to carry sick and wounded. This number was subsequently augmented.

It was considered that about 1,000 wounded could be evacuated from Es Sinn to Shaikh Saad every twenty-four hours on the basis of one stretcher case to four sitting cases, that is to

say, four stretcher cases or sixteen sitting cases could be carried in each truck. It was considered that the estimated number might be far exceeded when the trains were allowed to travel at night and more journeys could consequently be made. The majority of trucks had side-flaps and many of these had high wooden end-screens fitted so that the truck might be stacked with wood, fuel or other supplies on the outward journey. Over these end-screens a tarpaulin could be thrown, fixed and arranged so that the passengers would be shielded from the rain and wind on the one side, while the opposite side could remain partially open.

It was essential that there should be as little delay as possible in the loading and unloading of the trains with casualties ; hence medical reception tents were established at Shaikh Saad, Twin Canals and Es Sinn and subsequently at Imam-al-Mansur. Several tents were pitched close to the railway line and some were amalgamated so as to form one large room. In these the patients were collected ready for entraining directly the train arrived. Hot tea and milk and other refreshments as well as cigarettes were distributed at these places. After the experience gained with the first few trains, it was found that the patients could be unloaded in ten minutes and loaded almost as quickly.

The A.D.M.S. of the 7th Division was responsible for the evacuation by river, the numbers placed on board the ships being communicated to the A.D.M.S., Shaikh Saad. The vessels available for evacuation by river to Shaikh Saad were the paddle steamer " P 35," the large twin screw hospital launch, " Kamala," and six motor launches. Two extra motor launches subsequently arrived. Some of the launches were capable of evacuating twelve stretcher cases or twenty-four sitting cases ; others could carry eight stretcher cases and ten sitting cases or thirty sitting cases. The paddle steamer, " P 35," was capable of carrying 150 to 200 wounded in one journey, and two journeys from Arab Village to Shaikh Saad and back could be made in twenty-four hours. The " Kamala " was fitted up completely as a hospital ship of fifty beds. It arrived fully equipped and could travel ten knots an hour.

In the event of the railway becoming blocked or in any way unavailable, an alternative scheme was considered. Casualty clearing stations were to be moved from their positions at Shaikh Saad to Arab Village and placed on both sides of the river. Casualties from the Sanna-i-Yat position would then be evacuated as before, but would be received in the casualty

clearing stations on the left bank of the river. Casualties from the Es Sinn position were to be collected at railhead, and from there conveyed by the motor ambulance convoy to the casualty clearing stations on the right bank of the river. The cars would then return by the road through Twin Canals, so that a circular route would be maintained. Casualties from the positions on the left bank of the river were to be collected at the Narrows and then conveyed by the motor ambulance convoy to Sandy Ridge, and from there by motor launch to Arab Village.

The ambulance transport present with the force operating on the Tigris on 12th December 1916 consisted of 61 ambulance wagons, 47 ambulance tongas, 15 Benares tongas and 77 motor ambulance cars.*

The ambulance transport placed at the disposal of the two cavalry brigades consisted of 14 light and 7 heavy motor ambulance cars, 15 Benares ambulance tongas, 6 army transport carts, 2 light and 3 heavy horsed ambulance wagons. The floors of the army transport carts were constructed like the Indian bedsteads of crossed strands of stout canvas. Twenty-five cars of No. 33 M.A.C. were distributed to the IIIrd Corps (13th and 14th Divisions), and 15 cars to the Ist Corps (3rd Division only).

The number of stretchers with the force, in addition to those allotted to regimental units, was 2,040.† A reserve of 100 stretchers was maintained with the field ambulance at Sinn railhead, 100 with the field ambulance at Twin Canals, 200

---

* This number included the cars of No. 33 M.A.C. which arrived in Mesopotamia from England on 10th October 1916. The scale of motor ambulance cars with the field ambulances was not complete. The total number of cars fit for use, excluding those at Shaikh Saad for local use, was 77, the remainder being under repair. The other motor ambulance convoys that subsequently served in Mesopotamia were Nos. 23, 39 and 40.

† Field ambulances mobilized in India (five to a division) each for 100 sick, were allotted 50 stretchers each; field ambulances mobilized in England (three to a division) each for 150 sick, 80 stretchers each; casualty clearing stations, 200 stretchers each. Hence the number of stretchers available was as follows:—

With the 6th Cavalry Brigade	50
,, ,, 7th ,, ,, ...	50
,, ,, 3rd Division	250
,, ,, 7th ,, ...	250
,, ,, 13th ,, ...	240
,, ,, 14th ,, ...	250
,, Four C.C.Ss.	800
,, No. 31 B.S.H.	25
,, No. 6 I.S.H.	25
,, No. 33 M.A.C.	100

with No. 5 Advanced Depôt Medical Stores at Arab Village, and 800 at Shaikh Saad. With each division there were 20 Rogers' trench stretchers, with a reserve of 40 at Shaikh Saad. The number of blankets in reserve at the ordnance depôt at Shaikh Saad was very large, and in addition to these the A.D.M.S. Shaikh Saad had 500 in his own charge, and there were 500 in reserve at Es Sinn ordnance depôt and 100 at railhead. A system of exchange of blankets and stretchers between the units at the front and the lines of communication was organized.

Shell dressings to the number of 4,000 were distributed among the 6th and 7th Cavalry Brigades and the 3rd, 7th, 13th and 14th Divisions. These were carried in regulation "shell dressing" haversacks, supplemented by ordinary haversacks with the words "shell dressings" painted on them, as the reserve of regulation waterproof haversacks for shell dressings, capable of holding twelve dressings each, were destroyed by fire in Basra, and a fresh supply had not arrived. The number of haversacks issued was 383. The reserve of shell dressings amounted to 6,835 at No. 6 Advanced Depôt Medical Stores at Arab Village, 5,520 at No. 7 Advanced Depôt Medical Stores at Shaikh Saad, and 30,500 at the Basra Base Depôt of Medical Stores.

There was a very large reserve of first field dressings, namely, 100,000 at Basra, 22,000 at Amara, 21,300 at Shaikh Saad and 18,700 at Arab Village. There was also a large reserve of ordinary equipment and dressings in all the medical store depôts.

A very large reserve of medical comforts was maintained at the supply depôt at Shaikh Saad. Soon after operations had started, a report was received that the supply at the front was insufficient, and 15 tons were immediately supplied. It was afterwards found, however, that there really was no shortage and an ample supply was available.

Arrangements were also made that all drinking water should be sterilized with chlorine supplied from the various chlorinating stations, or prepared with the apparatus in possession of the medical units. In addition to this, when chlorination was not available, detached parties were to be provided with tablets of bisulphate of soda. The medical officer, assistant surgeon or sub-assistant surgeon in charge of a unit, was authorized to keep sufficient tablets in his possession for three days' supply, (two tablets for each full water bottle), and these were issued as required.

Directions were given for every wounded man to receive a prophylactic dose of 500 units of anti-tetanic serum as soon as possible after his injury, and the inoculation was to be recorded by marking the letter "T" on the man's forehead with an indelible pencil and by writing the dose on the specification tally.

Preliminary Operations.

The operations for the advance commenced by a heavy bombardment on the Sanna-i-Yat positions from both banks of the river on the 13th December 1916. The two brigades of cavalry moved off from Arab Village for Es Sinn. There they rested and started off very early on 14th December so as to arrive at Basrugiya at daybreak. They crossed the River Hai at this place, meeting with very little opposition, and then moved north-west on the west side of the Hai. The Ist Corps then bombarded the Suwada position, which was four miles west of the Sanna-i-Yat position. In the meantime the IIIrd Corps started clearing the Megasis-Ruins-Kala Haji Fahan line, while the cavalry, in the evening of the 15th December, were some miles to the west of Bassouia.

The IIIrd Corps continued its advance in a north-westerly direction to within 1,000 yards of the defences of Kut on the south of the river, and the cavalry advanced west of Kala Haji Fahan. The bombardment of the Sanna-i-Yat position continued. The Arabs attacked the force at Basrugiya, but were driven off with many killed. On 17th December the IIIrd Corps gradually advanced and dug itself in on a line from Megasis to Kala Haji Fahan, the cavalry meanwhile keeping on the left flank and driving off hostile Arabs. On 20th December a force consisting of infantry and cavalry with other details and pontoons started at daybreak from a position in the low ground two miles west of Bassouia and proceeded directly west and then north of the river, with a view to throwing a bridge across the Tigris on the loop of the river next above the Shumran Bend. These troops were met by Turkish guns in a position on the opposite side of the river, and the attempt to form a bridge was abandoned. The force returned without having accomplished its object and remained out some distance west of the Hai river. On the evening of the 23rd December the cavalry assembled at Dujaila Redoubt and started off at 3 a.m. next morning for Fort Gussab, supported by a brigade of infantry. They arrived at daybreak, destroyed and burned the buildings and returned to Es Sinn about 4 p.m. By December 25th the

British line had progressed to within 1,000 yards of the Turkish trenches directly north of Kut. On the 26th there was heavy rain which interfered with operations, but on the 27th, notwithstanding the continuous rainfall which rendered movement of any sort difficult in the thick mud, and upset the railway service, a further advance was made of about 500 yards in the bend of the river east of Kut.

The sick and wounded evacuated from the 7th Division at Sanna-i-Yat position were brought by wheeled stretchers and ambulance wagons from the regimental aid post and collecting stations to the advanced dressing station on the right of the position, and thence by motor ambulance cars to the field ambulances at Falahiya, and from there to the ferry vessels on the left bank below Arab Village. Those from the left of the position were brought by hand or by wheeled stretcher to the left advanced dressing station on the bank of the river There they were placed on launches and conveyed to the ambulances at Arab Village where they were embarked on the ferry vessels.

The evacuation of casualties from the cavalry brigades was carried out by Nos. 119 and 131 Cavalry Field Ambulances. Each was equipped for 100 casualties. No. 119 accompanied the first column, and the bearer division of No. 131 the second column, leaving the tent division behind east of Bassouia. These columns returned to their positions west of the Hai, having sustained about 50 casualties. On the morning of 21st December twenty-six motor ambulance cars were collected and proceeded west to meet the force. This convoy met the force about three or four miles west of Bassouia and brought in all the casualties. The first of the casualties arrived at Es Sinn at 11 a.m. and all had arrived and been treated by 1.30 p.m. The two cavalry field ambulances then returned to their original position east of Bassouia.

Throughout the period of these operations the 3rd Division retained one section of No. 7 British Field Ambulance and No. 112 Indian Field Ambulance at the Narrows to collect their sick and wounded from the advanced dressing stations on the right bank of the river between Arab Village and Megasis. No. 111 Indian Field Ambulance and two sections of No. 8 British Field Ambulance remained at Twin Canals and maintained the reception tents there, supplying assistance and refreshment to the sick and wounded as they passed through by train, and receiving casualties from the ambulances at the Narrows. When the 3rd Division extended its line beyond Megasis, two sections

of No. 8 British Field Ambulance, No. 113 Indian Field Ambulance and three sections of No. 7 British Field Ambulance moved from their position at Sinn Abtar to the hospital area near the railhead and threw out two advanced dressing stations. From these positions the casualties were collected and sent down by train from Es Sinn railhead.

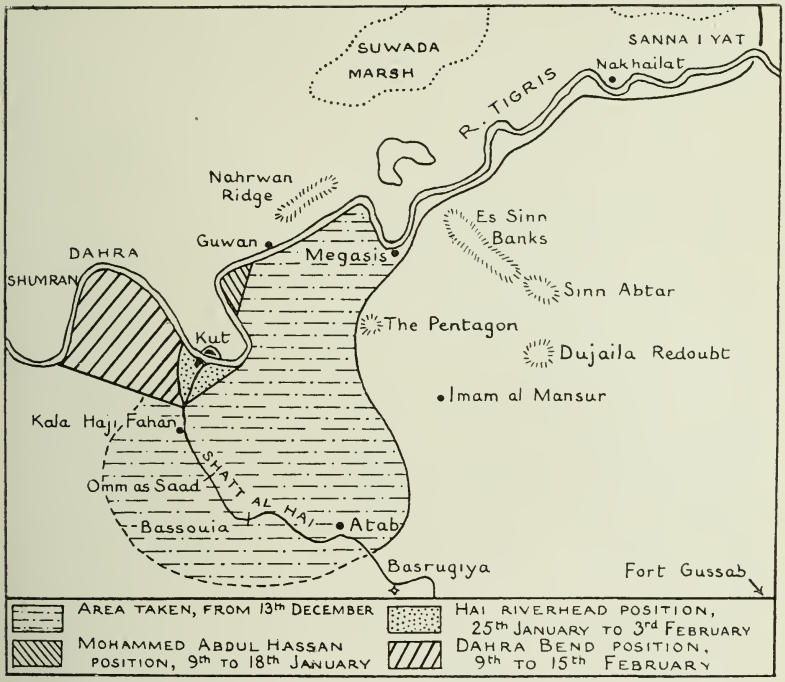
When the 13th Division moved forward, the tent division of No. 41 Field Ambulance remained at the hospital area near Es Sinn Banks and the bearer division was sent forward. Between the 19th and 28th December No. 39 Field Ambulance moved to a new position east of the River Hai, and No. 40 to the west of the river. Advanced dressing stations were thrown out with the bearer division at positions nearer the line. On the 20th December No. 40 Field Ambulance sent one tent sub-division on with the mobile force. The tent division of No. 41 Field Ambulance remained at Es Sinn while its three bearer sub-divisions went to positions near the line. On 21st December the tent sub-division with the mobile force rejoined its headquarters. On 24th December No. 41 left Es Sinn and opened at Imam-al-Mansur railhead.

At the commencement of operations all five combined field ambulances of the 14th Division, Nos. 1, 20, 21, 22 and 135, were at the hospital area near Es Sinn railhead. When the division moved forward advanced dressing stations were established near Omm-as-Saad, east of Hai. On 19th December Nos. 21 and 22 Combined Field Ambulances were closed ready to advance to Bassouia and the advanced dressing stations moved forward. Between 20th and 26th December the positions of the 14th Division field ambulances were frequently changed to conform to the movements of the troops. On 26th December Nos. 1 and 21 Combined Field Ambulances were at Es Sinn, Nos. 20 and 135 Combined Field Ambulances at Imam and No. 22 Combined Field Ambulance near Omm-as-Saad. Casualties from the Es Sinn position on the right bank were brought in from the advanced dressing stations by motor cars, ambulance wagons and tongas to the tent divisions at railhead, and from there by train to the casualty clearing station at Shaikh Saad. Casualties from the positions south of the river were conveyed by motor ambulance cars and ambulance wagons to the field ambulances at Twin Canals, and thence by train to Shaikh Saad.

After the operations during December 1916 and up to February 1917 fighting continued and three main positions were taken—the Mohammed Abdul Hassan position on 9th to

18th January, the Hai Riverhead position, 25th January to 3rd February, and the Dahra Bend position, 9th to 15th February. The intermediate periods were taken advantage of to make further preparations for attack, to move troops gradually forward and to consolidate the positions already captured.

A rough outline of the different positions is shown on the shaded sketch map.



SKETCH MAP SHOWING THE TURKISH POSITIONS AT KUT DECEMBER 1916–FEBRUARY 1917

By the 8th January a large area of country had been taken and the Turks were shut in in strongly entrenched positions at Mohammed Abdul Hassan and the Hai Riverhead. On the 9th January the Mohammed Abdul Hassan trenches were stormed, and the position was completely taken by the 3rd Division on the 18th January. The total number of sick and wounded during this period was 1,493, consisting of 102 British sick and 346 wounded and 223 Indian sick and 822 wounded.

On the 25th January the Hai Riverhead trenches were stormed and were occupied by the IIIrd Corps on 3rd February. The wounded numbered 1,032 in the 13th Division and 2,015 in

the 14th Division. The Turks, as the pressure from the south-east and south increased, retired on their picquets in the Dahra Bend and consolidated a continuous line of works across the Bend.

By the morning of the 16th February they were beaten and suffered heavy losses, including 2,005 men taken prisoner. The attack was again carried out by the IIIrd Corps but the casualties were slight, there being only 348 wounded in the 13th Division and 126 in the 14th Division.

The weather on the whole was favourable, but occasionally rain and fogs disorganized these operations. At first the train service was seriously disarranged by the subsidence at various places of the ground over which the lines had been laid. This was rapidly rectified and the trains were afterwards able to run more or less regularly.

No. 16 C.C.S.(British) and No. 19 C.C.H.*(for both British and Indians) moved by train at 4 a.m. and by motor cars at 8 a.m. on 8th January from Shaikh Saad to Imam-al-Mansur, where a site had been selected for them between the railway line and the road. The portions of these constituting the 1st echelons were first brought up, leaving the 2nd echelons to follow as opportunity offered and transport became available. The first echelons brought a supply of tents, stretchers, blankets, cooking utensils and all the other necessaries required for the immediate establishment of a casualty clearing station. The second echelons carried the heavier portion of the equipment, such as portable iron bedsteads, which could not be considered as absolute essentials.

The tents were immediately pitched, and the casualty clearing stations were made ready for the reception of wounded by the evening. Orders had been issued to the officers commanding that they must be prepared for patients by 6 a.m. on 9th January. Arrangements were made for water supply. Each casualty clearing station secured from Twin Canals a 2,000 gallon canvas tank and ten camel pakhals for bringing water from wells in the Dujaila depression. In a few days the equipment of the second echelons was brought up and the casualty clearing stations became thoroughly equipped. Throughout the operations these units did not move and they received all the sick and wounded from the front area.

On 3rd February 1917, owing to an accident on the railway line, the evacuation from Imam was delayed, and an accumulation of 521 sick and wounded collected in the casualty clearing stations. The units were able to deal with them without any

* No. 19 Combined Clearing Hospital subsequently designated No. 19 Casualty Clearing Station.

difficulty, but had there been a further influx of wounded to any large extent before the line was cleared, some strain might have been put on the accommodation. To prevent the possibility of undue congestion in the casualty clearing stations, five extra European pattern tents were allotted to each and arrangements were made to make use, if occasion required, of the light Ford lorries which proceeded daily from Imam to Arab Village empty and returned with supplies of various sorts. It was arranged that if there was any large accumulation of cases and if for any reason there was difficulty in the evacuation by the ordinary railway route, the officer commanding the lorry convoy should arrange to carry the less serious cases to Arab Village where they would be embarked on the river steamers for Shaikh Saad.

Nos. 15 and 20 C.C.Ss. were kept at Shaikh Saad to receive the sick and wounded arriving by train from the advanced casualty clearing stations or by river from Arab Village, and to deal with them prior to their embarkation on board the river steamers.

Orders were issued to the effect that from 6 a.m. on 9th January all evacuation of sick and wounded west of the line Megasis-Imam should be made through Nos. 16 and 19 C.C.Ss. at Imam-al-Mansur.

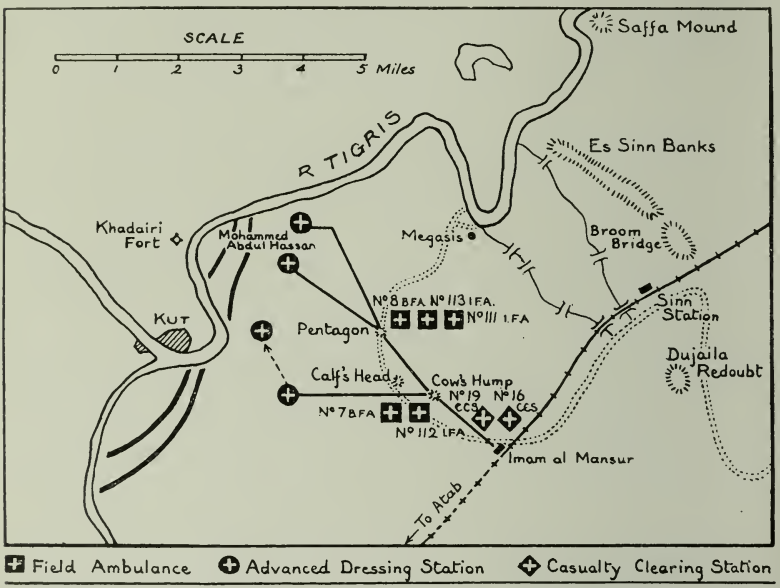
The railway line was gradually being extended beyond Imam to Atab, and when it was opened there two trains per day travelled beyond Imam. The question was considered whether it would not be better to move the casualty clearing stations to the new railhead, and thus save the road journey for the ambulance cars, but in view of the small number of trains available for the evacuation the subject was dropped. A reception camp was, however, established at Atab so that in the event of heavy rain, rendering the road very heavy for traffic, patients might be collected at railhead and transferred from the motor cars to the train for conveyance to the casualty clearing stations at Imam if necessary.

The evacuation of the sick and wounded by the river route was continued as already described.

As already mentioned, Colonel W. H. Starr, A.M.S., acted as D.D.M.S. with advanced G.H.Q.; and at each corps headquarters there was a medical officer who reported to him. Later the army commander approved of the appointment of a D.D.M.S. for each corps, and on the 15th January Colonel Starr was appointed D.D.M.S. of the Ist Corps, while Brevet-Colonel J. M. Sloan, R.A.M.C. became D.D.M S. of the IIIrd Corps. Colonel F. Wall, I.M.S., became A.D.M.S. of the

Cavalry, which was now given a divisional organization. In consequence of these changes the D.M.S. moved his office from Shaikh Saad to advanced General Headquarters at Es Sinn, where all reports were collected from the two corps and the cavalry division.

During the operations against the Mohammed Abdul Hassan positions the field ambulances of the 3rd Division were posted as follows: No. 7 British Field Ambulance and No. 112 Indian Field Ambulance were at Cow's Hump. They opened a combined advanced dressing station which was moved forward to



SKETCH MAP SHOWING THE ROUTE BY WHICH CASUALTIES WERE EVACUATED FROM THE ACTION AT MOHAMMED ABDUL HASSAN

a situation within half a mile of the regimental aid posts. No. 8 British Field Ambulance, less one section, No. 111 Indian Field Ambulance, less one section, and No. 113 Indian Field Ambulance were at the Pentagon with advanced dressing stations organized in a nullah the direction of which was almost due west and along which the wounded could be carried protected from the fire from the opposite side of the river.

All wounded were brought to these field ambulances by field ambulance transport.

For conveying the wounded to the casualty clearing stations at Imam, 25 cars of No. 33 M.A.C. had been allotted to the Ist Corps.

Wounded began to arrive at the casualty clearing station at 2 p.m. and after treatment were promptly evacuated to Shaikh Saad by train. The arrangements for the railway journey were continued as before, there being reception tents superintended by a medical officer at Imam, at Es Sinn in case the trains were detained for any reason at this place, at Twin Canals and at Shaikh Saad. These reception tents were capable of being warmed by means of oil stoves, and food, hot drinks and cigarettes were provided.

All the stretchers and railway truck boards to support the stretchers in the train, which had been " dumped " at Es Sinn had been removed to the reception tents at Imam. The scheme for the exchange of blankets and stretchers was carried out as far as possible, but owing to delays in the returning of these, it was found necessary to supplement the store of No. 16 Casualty Clearing Station by 500 extra blankets and several stretchers.

After the action at the Mohammed Abdul Hassan position the Ist Corps took over the whole line from the mouth of the Hai River to Abu Roman as well as holding the Sanna-i-Yat position.

The area extended from Megasis to Abu Roman and was divided into three sections. The casualties of the left section from Megasis to the Saffa Mound were received by three sections of No. 128 Indian Field Ambulance and one section of No. 20 British Field Ambulance at Broom Bridge and transferred to Es Sinn station, from which place they were sent by train to Shaikh Saad. Those from the centre section from Saffa to Bait Aissa, and from the right section, Bait Aissa to Abu Roman, were taken into the section of No. 128 Indian Field Ambulance posted at the Narrows. From the Narrows the casualties were conveyed by ambulance wagons or cars to Sandy Ridge, where they embarked on the motor launches and were taken to the field ambulances on the left bank of the river prior to their passage to the casualty clearing station at Shaikh Saad.

No change was made in the evacuation from the Sanna-i-Yat position, except that the large hospital launch " Kamala " collected the casualties daily from a more advanced position than before, and berthed at a position below the advanced bridge of boats collecting the sick from the field ambulances established at Falahiya.

A brigade of the 3rd Division was attached about 21st January to the IIIrd Corps to take over the defences from a point

east of Bassouia to the Hai River, and No. 111 Indian Field Ambulance and two sections of No. 7 British Field Ambulance accompanied this force and opened near Bassouia. The sick from this area were evacuated in the same way as the other troops in the vicinity.

The cavalry were constantly moving and undertaking various raids or flank attacks. The cavalry field ambulances supplied the necessary medical assistance for those movements. Their main positions were either at Arab Village or south of the river Hai near the bridge of boats. The movements of the infantry divisional field ambulances accorded with the movements of their respective divisions.

The reserve of blankets and stretchers was increased as the line extended. Throughout there was no difficulty in meeting all demands.

The ambulance transport for further operations was fixed on the following scale :—

Corps.	Division.	Transport Allotted.
Ist ..	3rd	30 horsed wagons, 20 Ford cars.
	7th	30 ,, ,, 20 ,, ,,
IIIrd ..	13th	30 ,, ,, 18 ,, ,,
	14th	60 Benares tongas, 20 ,, ,,
	Cavalry	20 ,, ,, 11 ,, ,, and 3 wagons.

No. 33 M.A.C. of 50 Ford cars was used for evacuating the tent divisions of field ambulances.

After rain there was so much tenacious mud that very little ambulance transport could be used, and it was found absolutely necessary to have at least eight mules on each of the heavy ambulance wagons.

The Benares ambulance tongas proved a complete failure with the cavalry divisions. Owing to their weak structure many of them broke down when used over difficult country and, even when strengthened by using army transport cart wheels and axles, they continued to break down and some had to be abandoned. The Indian tongas with ox transport were much too slow, and their capacity was very limited. It therefore became necessary to re-distribute the ambulance transport, as only ambulance wagons and motor cars had, in actual practice, proved of any real value.

There were two kinds of ambulance wagons in use—the light and the heavy patterns. It was decided to keep to the

authorized number of motor cars given above and distribute the wagons as follows :—

	Light Wagons.	Heavy Wagons.	Tongas for Local use.
3rd Division	3	11	23
7th Division	3	11	23
13th Division	3	11	23
14th Division	3	11	23
Cavalry Division	12	—	—

The A.D.M.S. of each division had power to distribute these ambulance vehicles as he wished.

Indian ambulance tonga.

The motor ambulance transport having proved a great success, all motor ambulance cars that were not urgently required at Nasiriya or on the lines of communication were brought up to the Tigris front. It was intended to have a uniform pattern of car at the front, and the Ford car was selected for this purpose ; all other makes at the end of operations were sent for use on the lines of communication. As additional motor cars arrived, they were distributed as seemed desirable.

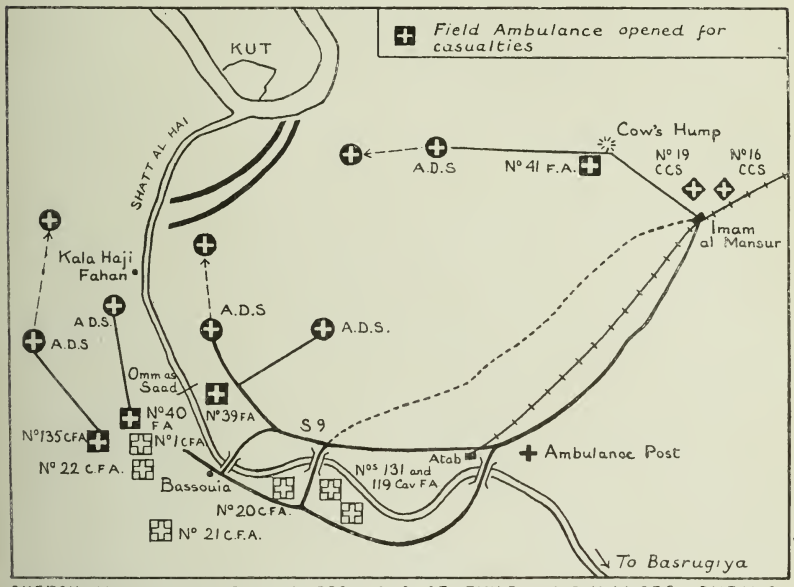
Of the motor cars allotted to each infantry division, one half were with ambulance bodies and one half touring cars. The latter, used only for sitting cases, proved of great value, being very much lighter than the cars with ambulance bodies; they travelled over irregular or muddy ground with greater ease and rapidity and with fewer breakdowns.

The action against the Hai riverhead trenches was commenced on January 25th by the 13th Division supported by the 14th Division. They attacked the enemy positions on both sides of the river Hai.

The fighting on the west side of the river was especially severe. The 13th Division troops were driven out of the trenches they had taken; they reoccupied them but were once more driven out before nightfall. On the east side of the river all the trenches that were taken were retained. Fighting continued day after day until the Turks were driven out of all their positions.

The field ambulances of the 13th Division and No. 133 Combined Field Ambulance of the 14th Division were mainly employed. No. 41 Field Ambulance was sent to Cow's Hump, and established an advanced dressing station very close to the regimental aid posts, as good cover was available in nullahs running from the Tigris more or less parallel to the line of trenches. When the troops advanced, this dressing station was moved forward. Good communication trenches were cut for the evacuation of casualties from the regimental aid posts, and owing to the nature of the ground and a certain amount of forbearance on the part of the enemy, ambulance vehicles were able to get up to the advanced dressing station at practically any hour. By this arrangement the wounded were evacuated from the right position direct to Cow's Hump and then to the casualty clearing station at Imam-al-Mansur, and were not carried back across the front of the position to the ambulances on the Hai. No. 39 Field Ambulance was opened on the east bank of the Hai. This unit established an advanced dressing station well forward. There was a nullah running directly south from the trenches, and it was considered that wounded might find their way along it. Hence the bearer division of No. 21 Combined Field Ambulance of the 14th Division was sent to establish an advanced dressing station at the end of the nullah, at a point midway between the advanced dressing stations opened by Nos. 39 and 41 Field Ambulances. Any wounded collected at this place were sent to No. 39 Field Ambulance.

No. 40 Field Ambulance was opened on the west side of the Hai. This unit established its advanced dressing station 800 yards behind the 13th Division front line. The greatest number of casualties was collected in this region, and the work devolving on the field ambulance was very heavy. When the 13th Division retook the trenches they had previously taken, and out of which they had been driven, some British wounded who had fallen into the enemy's hands were found alive but completely stripped and suffering severely from



SKETCH MAP SHOWING THE POSITIONS OF FIELD AMBULANCES DURING THE HAI RIVERHEAD OPERATIONS, JAN. 25 – FEB. 3, 1917.

exposure. When the brigade was relieved, No. 40 Field Ambulance was also relieved. Its advanced dressing station was withdrawn on 30th January, and the work taken up by the field ambulances of the 14th Division.

The wounded from the left of the position were collected by No. 135 Combined Field Ambulance of the 14th Division which opened beside No. 40 Field Ambulance. It also opened an advanced dressing station well forward. It was relieved by the bearer division of No. 21 Combined Field Ambulance of the 14th Division on 30th January.

All wounded from Nos. 39 and 40 Field Ambulances and No. 135 Combined Field Ambulance were evacuated by the

roads running on each side of the river, through Atab to Imam-al-Mansur. Those from the west side of the Hai crossed the river at the bridge of boats. The return journey was made across the river at Atab along the road to the south of the river. All horse vehicles had to avoid the motor road which was very rough at the beginning of the operations, but was subsequently improved. They were directed to return by a rougher road direct from Imam to the bridge at Bassouia. In this way the traffic was maintained more or less in one direction.

The evacuation was carried out steadily and without any congestion. The time occupied on the journey from the ambulances west of the Hai at Omm-as-Saad to the casualty clearing station at Imam was about one and a quarter hours, the cars moving slowly along the rough road. The D.D.M.S. IIIrd Corps established a post on the east side of the river at Atab, past which all vehicles had to move. Here a medical officer and a few men were posted with instructions to stop all ambulance cars and transfer any slight cases to the small Ford lorries that were constantly running between Imam and Atab, bringing up ammunition and other supplies and returning empty. This meant a saving of six to seven miles for a large number of motor ambulance cars. The ambulance cars conveying the more serious cases were allowed to proceed on their journey and go direct to the casualty clearing station at Imam.

Towards the termination of this phase of the operations the railway extension from Imam to Atab was completed. Most of the trains from Shaikh Saad did not proceed beyond Imam, and only two trains each day continued the journey over the whole length of the line. Advantage was at once taken of these trains for the evacuation of sick and wounded. A medical post had been opened at Atab and an area marked off for the establishment of casualty clearing stations in the event of it becoming necessary to move them to this place.

Atab was considered a more suitable centre than Es Sinn for the cars of No. 33 M.A.C., and on the 29th January the headquarters and all ambulance cars moved there and were placed under the orders of the D.D.M.S. IIIrd Corps. The workshop was left at Es Sinn, where it could be of benefit to ambulance cars of field ambulances, in addition to the cars of the motor ambulance convoy.

By 13th February the troops of the IIIrd Corps were well established on the river on each side of the Dahra Bend on the right bank of the Tigris, and a large force of Turks was hemmed in between the British trenches and the river. The next day

was occupied in consolidating the position gained and making preparation for the final assault. The attack at the Dahra Bend was made on 15th February by the IIIrd Corps, the 13th Division being on the left and the 14th Division on the right, while the Cavalry Division operated on the left flank towards Shumran. The position was captured by nightfall, and during the night and early the next morning various small collections of the enemy in the bend were rounded up.

The field ambulances of the two divisions were mostly grouped in a suitable area west of the river Hai at Omm-as-Saad. At this position water and other supplies could be conveniently obtained. Nos. 39, 40 and 41 Field Ambulances of the 13th Division were opened here, together with Nos. 1, 22 and 135 Combined Field Ambulances of the 14th Division. No. 20 Combined Field Ambulance of the 14th Division had been opened three-quarters of a mile further forward, and near the divisional headquarters. No. 21 Combined Field Ambulance of the 14th Division was moved still further forward. Advanced dressing stations were established about half a mile from the regimental aid posts in the trenches. Rough collecting posts were formed midway between Nos. 39 and 40 Field Ambulances, with No. 21 Combined Field Ambulance clearing the right half of the area and No. 40 Field Ambulance the left half.

The evacuation of these field ambulances was carried out along the same routes as described in the arrangements when the Hai riverhead trenches were attacked.

The Capture of Kut and Advance to Baghdad.

On the 17th February the Sanna-i-Yat position was attacked by the 7th Division of the Ist Corps after a heavy bombardment. The two front trenches were taken and there was severe fighting. The troops, however, did not maintain their hold and retired to their own lines before dark. The total number of wounded of all ranks was 336.

The field ambulances of the division were opened at Arab Village and at Falahiya.

One advanced dressing station was on the right and another on the left flank. Evacuation from the right advanced dressing station was carried out by horse and motor vehicles, and that from the left advanced dressing station by means of launches. The latter station had a long communication trench cut to the river bank and launches could be drawn up

at its exit. Four launches worked continually between this post and the field ambulances at Falahiya, a distance of 2,900 yards.

The hospital steam launch "Kamala," the paddle steamer "P.35" and the tug "M.190" with the hospital barges "Calcutta" and "Doris" conveyed the wounded from the field ambulances to the casualty clearing stations at Shaikh Saad. Each of these vessels could make two journeys a day if necessary, but a second journey was not required. The "Kamala" could proceed above the pontoon bridge under cover of the river bank. The "P.35" not being a hospital ship and having its funnel clearly visible above the bank was not allowed to be at Falahiya except after dark in order not to attract fire. It was arranged that this vessel should berth above the lower pontoon bridge at Arab Village so as to be available after dark for work higher up if necessary without waiting for the bridge to be opened for it to pass through. The other launches were kept in reserve and for local use such as conveying casualties from the right to the left bank.

On the 22nd February the 7th Division again assaulted and captured the two front trenches on the left of the Sanna-i-Yat position. The enemy made seven counter-attacks, but all were driven back. Further progress was not made as the enemy was found in force in their third line, which had been reinforced by about 2,500 men.

On the night of the same day, a detachment of an Indian battalion crossed to the left bank of the river at Megasis, and raided the enemy trenches. After inflicting damage on the enemy and capturing material, the troops returned to the right bank with a loss of one British officer and seven Indians wounded and one Indian missing.

The next day, 23rd February, the attack on the Sanna-i-Yat trenches was continued, and simultaneously at daybreak the 14th Division of the IIIrd Corps commenced the crossing of the river at the Shumran bend.

It was arranged that three columns, starting at dusk on the evening of 22nd February, should advance from a point called Oxford Circus, march by different routes and cross the Tigris at three different ferries known as Nos. 1, 2, and 3 Ferries.

The crossing commenced at 5.30 a.m. The 37th Brigade of the 14th Division at No. 1 Ferry got men established on the left bank fairly soon, but the other brigades at Nos. 2 and 3 Ferries were not successful owing to the heavy machine

gun and rifle fire poured into them from entrenched enemy positions. Eventually troops crossed in pontoons at the position of No. 1 Ferry only. Meanwhile, the building of a pontoon bridge was in progress and by the evening it was complete despite the river being in flood.

The greatest number of casualties occurred on the right bank at Nos. 2 and 3 Ferries and in the pontoons at those positions, but when once the troops had actually crossed, the number of casualties was small.

By sunset the 14th Division was across the river and had advanced towards the base of the Shumran peninsula, while

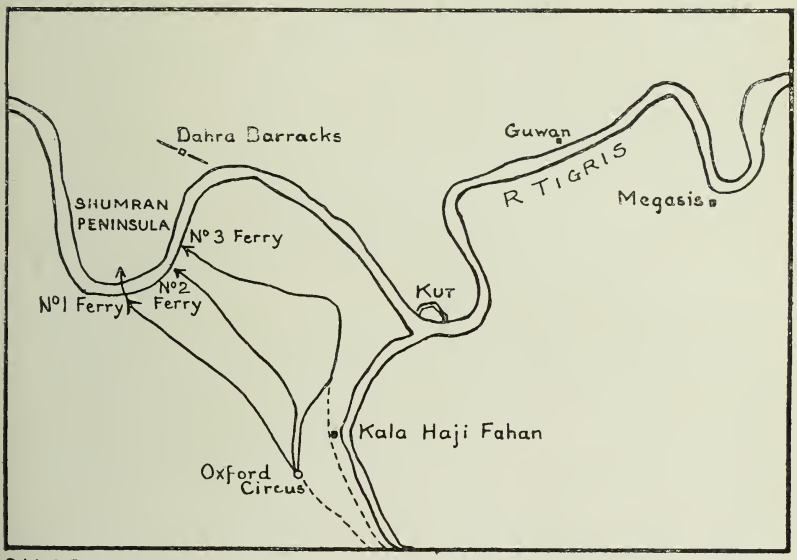


DIAGRAM ILLUSTRATING THE CROSSING OF THE RIVER TIGRIS, FEBRUARY 22ND AND 23RD, 1917.

on the Sanna-i-Yat side the 7th Division had occupied the third line of Turkish trenches, and the enemy was retiring from that position.

The 7th Division continued to advance and by daybreak on the 24th February had occupied the fifth line of Turkish trenches at Sanna-i-Yat, and the 14th Division and one brigade of the 13th Division were on the Shumran Peninsula. During the day the cavalry and the rest of the 13th Division crossed by the bridge. The 14th Division, in advancing over the open plain to the Dahra barracks, suffered severely and the rapid collection and evacuation of the wounded was difficult.

The Ist Corps divisions continued their advance and found the Suwada position evacuated by the enemy. Before dark the naval monitors passed up the river and anchored at Guwan. Early on 25th February, the monitors moved forward past Kut, which was deserted, and arrived at the pontoon bridge at Shumran Bend. During the day the cavalry and the naval monitors pursued the retreating enemy. The 13th Division and 14th Division started for Shaikh Jaad, which was ten miles above Kut by direct route, and forty miles by river.

For these operations the instructions issued by the D.D.M.S. of the IIIrd Corps were as follows :—

1. " Regimental medical officers will not cross the Tigris with the leading detachments of troops, but later on with the regimental reserves and divisions will be prepared to deal with casualties on the left bank for a period of twenty-four hours.
2. The A.D.M.S., 14th Division will detail twelve men of the army bearer corps to accompany each regimental medical officer to assist in the construction of aid posts.
3. No wounded will be evacuated across the river until the bridge has been constructed and is reasonably safe (this was subsequently modified, and many wounded were brought back in the returning pontoons).
4. Evacuation of tent divisions will be carried out at first by No. 33 M.A.C. which, if necessary, may later be assisted by motors of the field ambulances.
5. All ambulance transport will cross the river Hai on both forward and rearward journeys by the Bassouia bridges.
6. Sitting cases will be sent to the medical entraining station at Atab; stretcher cases will be sent direct to Nos. 16 and 19 C.C.Ss. at Imam-al-Mansur.
7. A supply of chlorinated water in pakhals will be arranged for at the ferrying points (right bank) to be taken across the river as opportunity offers for use in the aid posts."

The field ambulances of the 14th Division were distributed in the neighbourhood of Oxford Circus. Nos. 1, 20 and 135 Combined Field Ambulances had opened advanced dressing stations about two miles from the sites of Nos 1 and 2 Ferries.

The regimental aid posts of the three columns which advanced from Oxford Circus were established in the vicinity of Nos. 1, 2 and 3 Ferries, and the A.D.M.S., 14th Division, detailed two medical officers to cross the river early after the troops had been established on the left bank taking with them dressings, morphia and iodine to render assistance as soon as possible on the opposite bank. Two medical officers remained at the regimental aid posts on the right bank.

In consequence of the crossing being carried out at No. 1 Ferry, the advanced dressing station of No. 20 Combined Field Ambulance moved forward at 10 a.m. to within a mile of the ferry, and the advanced dressing station of No. 135 Combined Field Ambulance joined it from its position on the left flank. These two advanced dressing stations therefore received all the

wounded that were brought across the bridge. An advanced dressing station was opened by No. 1 Combined Field Ambulance one and a half miles from No. 2 Ferry at 1 p.m. No. 21 Combined Field Ambulance opened an advanced dressing station half a mile further forward, and No. 1 Combined Field Ambulance advanced dressing station then closed down.

The field ambulances were purposely kept well behind as it was considered that by moving them forward to the Shumran bend they might give information as to the intentions of the force. But all arrangements were made for their rapid advance as soon as the action developed. The reserve of medical

Pontoon bridge over the Tigris, with field ambulance at bridgehead, right bank.

comforts with the divisional supply columns was distributed among the field ambulances in view of these being required immediately after the crossing.

The evacuation of sick and wounded from the field ambulances was to be carried out on the same lines as previously laid down for the right and left banks of the river respectively. When the crossing had been accomplished and the Turks were retreating, No. 15 C.C.S. was ordered to proceed from Shaikh Saad to Shumran by steamers as soon as possible, while Nos. 16 and 19 C.C.Ss. were to close directly evacuation through them ceased and return to Shaikh Saad by train ready to proceed up river by steamer as soon as they received orders.

The bridge was finished in the evening and at 6 p.m. the 36th Brigade began crossing to join the 37th Brigade on the other side. Then the 35th Brigade followed. When these brigades were ordered to advance Nos. 21 and 22 Combined Field

Ambulances were ordered to proceed to the neighbourhood of Bridgehead as soon as they could evacuate their patients. The A.D.M.S. of the Division made a mistake in not ordering a field ambulance to cross with the troops to the left bank as the wounded collected there suffered and could not be evacuated in face of the heavy forward traffic.

The total number of wounded admitted to the field ambulances, through their advanced dressing stations up to 6 p.m. 23rd February, was 135. There was great difficulty in getting the medical units across the bridge, and in bringing anything from the left to the right bank against the advancing traffic.

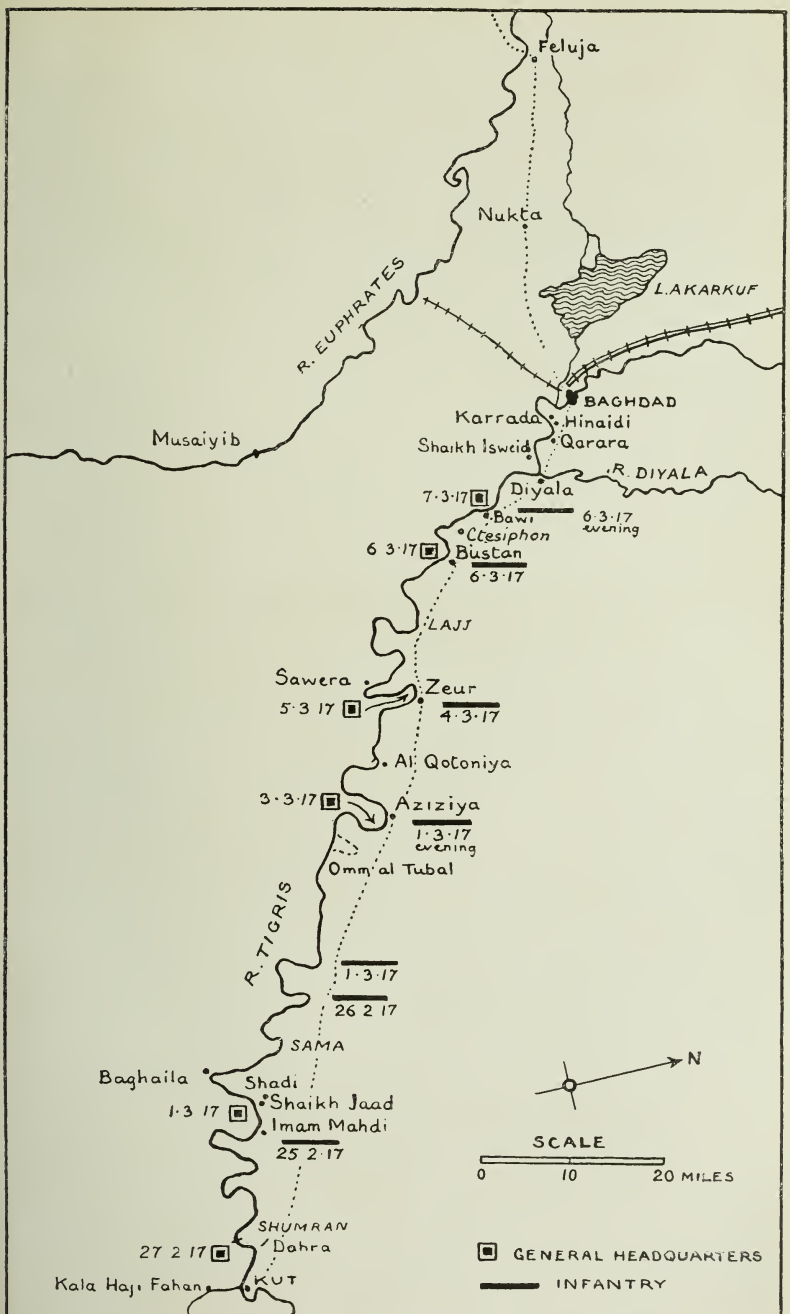
Early in the morning of the 24th February two bearer subdivisions and No. 1 Combined Field Ambulance had crossed to the other side and brought the wounded from the regimental aid posts to the bridge, where the bearers of Nos. 20 and 135 Combined Field Ambulances brought them to the advanced dressing stations. Nos. 21 and 22 Combined Field Ambulances were advanced to a position near Bridgehead on the right bank and Nos. 1 and 22 Combined Field Ambulances and No. 39 Field Ambulance formed advanced dressing stations across the river.

In the evening attempts were made to get the advanced dressing stations of Nos. 20 and 135 Combined Field Ambulances across, but the whole bridge was blocked. The wounded from these advanced dressing stations were brought back and collected on the left bank at Bridgehead and periodically the traffic was stopped to permit them to be carried across the bridge.

The total number of wounded admitted to the field ambulances for twenty-four hours from 6 p.m. on the 23rd to 6 p.m. on the 24th February was 597, besides 46 wounded Turks.

The pursuit of the enemy commenced from Shumran on 25th February. The monitors pursued him by river and the cavalry by land, followed by the infantry of the IIIrd Corps. The Ist Corps took over the line on the left bank of the Tigris. No. 1 Combined Field Ambulance, with the bearer divisions and advanced dressing stations of Nos. 20, 21 and 135 Combined Field Ambulances, moved off with the 14th Division. Nos. 39 and 40 Field Ambulances marched with the 13th Division, leaving No. 41 on the left bank of the Shumran peninsula with sick and wounded for evacuation.

The number of wounded to be evacuated from the 14th Division medical units was considerable and the tent divisions became somewhat congested. The evacuation of these from Shumran to the casualty clearing station at Imam-al-Mansur



SKETCH MAP SHOWING THE ADVANCE FROM KUT TO BAGHDAD, 1917

was carried out by No. 33 M.A.C. The river steamers only arrived at Shumran on the evening of the 25th February and after their arrival the motor ambulance convoy crossed the river at daybreak on 26th February, and commenced the evacuation from the new front to Shumran, and was able to bring back 405 wounded the same day. Until the arrival of the casualty clearing stations No. 41 Field Ambulance and No. 135 Combined Field Ambulance on the left bank of the river received all the casualties. No. 21 Combined Field Ambulance on the right bank was closed and ready to advance. A reception station for sick and wounded was established 400 yards below the Shumran bridge from which patients were embarked on the ships.

By the evening of 25th February the 13th Division had reached a position within two miles of Imam Mahdi and the 14th Division was about four miles behind.

No. 15 C.C.S. left Shaikh Saad at 6 p.m. on the 25th February and arrived the next morning at Shumran bridge. This casualty clearing station received orders to proceed to Imam Mahdi and open there, but was ordered to unload only sufficient tents and equipment for actual requirements.

Between 10 a.m. on the 26th February and 2.30 p.m. on the 27th February, 1,078 sick and wounded had been evacuated from Shumran to Shaikh Saad by the several steamers and the two field ambulances were then cleared.

The 1st echelon of No. 16 C.C.S. arrived at Shumran on 28th February, having moved first by train to Shaikh Saad and then by steamer to Shumran. It was ordered to continue its journey to Imam Mahdi. On the same day the hospital ship "Kamala," with the tug "M. 190" and its barges, moved off early for Imam Mahdi.

In the Ist Corps area the positions of the field ambulances were the same as for the attack on the 17th February and the distribution of launches and steamers with slight modifications was the same.

The final attack on the Turkish position on the left bank commenced at 10 a.m. and the first two launch loads of wounded were in the field ambulances at Falahiya by noon. By 2 p.m. 35 stretcher cases and 146 sitting cases, and by 8.30 a.m. the next morning 1,021 wounded, had been received into the field ambulances of the Ist Corps, and 556 sick and wounded had been evacuated to the casualty clearing station at Shaikh Saad. The right advanced dressing station came into use in the afternoon when the right section of the trenches was attacked.

Motor ambulance cars and horsed ambulance wagons were used for evacuating the sick and wounded from this advanced dressing station.

The evacuation from the left advanced dressing station was carried out entirely by launches. The system adopted was for one launch to remain under the bank and remain there until loaded. The other launches were moored at the bank near Corps Headquarters on the opposite side of the river. As soon as the launch on the left bank was loaded, it was cast off and one of those from the opposite bank took its place.

After unloading the casualties at Falahiya each launch returned and took up its position again, opposite the advanced dressing station. In this way a continuous stream of wounded to Falahiya was kept up.

There was a medical officer at Arab Village and another at Falahiya acting as embarkation medical officers under the A.D.M.S. of the 7th Division. The pontoon bridge had been accidentally broken and this accident proved to be an advantage, as there was then no delay in the passage of the vessels forward to the advanced positions.

The evacuation of wounded from Falahiya was maintained without interruption and the three field ambulances at Falahiya were consequently able to carry out the whole of the work. It was not necessary to utilize the two field ambulances, Nos. 19 British Field Ambulance and 130 Indian Field Ambulance, in reserve at Arab Village.

During the advance on Baghdad the general principle of evacuation of the sick and wounded was for the field ambulances to accompany their respective divisions. As sick and wounded were collected they were retained in one of the field ambulances until evacuated to a casualty clearing station by various vessels or taken over by a casualty clearing station. The field ambulances, whenever they were cleared, rejoined their divisions. The casualty clearing stations followed up and were established first at Imam Mahdi, then at Aziziya and finally at Baghdad. In this way the majority of casualties were passed through a casualty clearing station.

H.M.S. " Moth " during the advance, captured the Turkish steamer " Basra " which had been built for traffic on the Tigris and had been used to convey the Turkish wounded from the front to their hospitals. Attached to it were one barge and two smaller barges. An inspection of this ship was immediately made. It was indescribably filthy and insanitary. Deaths were occurring hourly from relapsing fever and from wounds

which, in the majority of cases, had not been dressed at all. At the time of inspection the senior Turkish medical officer and four other medical officers were on board, with a student who had been educated in America, and a dispenser. The total number of sick and wounded on board was about 1,000 with seven dead awaiting burial. A British medical officer was placed on board and he assumed charge until the ship reached Shaikh Saad. It was imperative that disinfection should be carried out, and this could not be done at Shumran. The corpses were taken off and buried and the ship continued its journey to Shaikh Saad, where it arrived in the evening. During this short journey there were six more deaths and many more arrived in a dying condition. On arrival at Shaikh Saad all the patients were removed to a double decked barge alongside, and the "Basra" and barges were thoroughly disinfected and cleaned. This work took all day and night and by the morning it was ready for reoccupation. The cases of relapsing fever on board were at first regarded as cases of typhus fever, but their true nature was determined by laboratory examination. All the prisoners who could walk were marched in batches of fifty to the disinfecting station, washed, reclothed and then sent on board the cleaned boat. All serious cases of wounds and of sickness were removed to No. 20 C.C.S. By mid-day on the 3rd March 1,062 prisoners and crew had been disinfected and dealt with by the medical officers and the ship then sailed for Basra. The total number that arrived there was 1,002. The medical officer in charge of the ship was instructed to take blood smears of the patients on board and he handed them over at Amara to be examined. The results of this examination were wired to the A.D.M.S. at Basra in order to give him some idea of the number of infectious cases he might have to isolate and treat.

Bathing establishment, with disinfecting section, Mesopotamia, 1917.

The hospital ship "Coromandel" had been ordered up the river and on 1st March 1917 was detailed to collect any sick at posts along the river between the advanced casualty clearing

station and Shaikh Saad and hand them over to No. 20 C.C.S. at that place.

On that date the Cavalry Division was about eight miles east of Aziziya, the 14th Division, having passed through the 13th Division, was at the first main bend of the river below Aziziya and the 13th Division was at the next bend. One division of the Ist Corps was between the 13th Division and Imam Mahdi. The other division of the Ist Corps was between Imam Mahdi and Shumran. The casualty clearing stations were being brought up the river. Nos. 15 and 16 had arrived at Imam Mahdi and No. 19 was following. Two advanced depôts of medical stores, one from Arab Village and one from Shaikh Saad, the motor ambulance convoy workshop and the bacteriological barge were ordered to move up to Imam Mahdi as soon as transport was available.

Advanced general headquarters, to which the D.M.S. was now attached, left Shumran at noon on 1st March and arrived at Shaikh Jaad at dusk.

On 3rd March, advanced general headquarters left Shaikh Jaad and arrived at Aziziya. There had been a certain amount of fighting with the Turkish rearguard who were entrenched there, and the Cavalry, 13th and 14th Divisions were still in the vicinity. The steamer with No. 16 C.C.S., which had not disembarked, was ordered up from Imam Mahdi. No. 15 C.C.S. was also ordered to proceed direct to Aziziya and open there.

On 4th March the troops were distributed as follows: the Cavalry and IIIrd Corps Divisions were leading the advance. Four days later the cavalry were in action at Lajj, where a Turkish infantry battalion with guns opposed them. The British casualties were 6 officers and 40 other ranks. The enemy was reinforced, and the cavalry again went into action and had about 150 casualties.

The evacuation of wounded was carried out by returning ships. The hospital steam launch "Kamala" embarked all severe cases at Zeur and took them down to Aziziya at daybreak. The cavalry passed Ctesiphon at 10 a.m. on 6th March and reached a position about four miles below Diyala. They returned and bivouacked at Bawi. On the 7th March, advanced general headquarters moved to a position above Bawi. The enemy on that date was holding the line of the river Diyala, and the 35th Infantry Brigade was ferried across the river Tigris in the evening and advanced along the right bank. On the following day a pontoon bridge was thrown across the river at Bawi, and the Cavalry and 7th Divisions crossed over

to the right bank. The cavalry had orders to proceed to Baghdad the next day and at once seize the bridge across the Tigris there and occupy the Citadel and other public buildings, as the enemy had taken up positions on both sides of the river Tigris and held the right bank of the river Diyala.

The enemy's positions were attacked on 9th March. A British battalion, despite strenuous efforts on the part of the enemy, crossed the river Diyala, gained a footing and held the position until two more battalions of the 13th Division joined it. The artillery with the 35th Brigade on the right bank of the Tigris continued to shell the Turkish position on the Diyala and the Turks vacated their trenches on the next day. The whole of the 13th Division crossed the river Diyala, and the troops on the right bank of the Tigris advanced towards Baghdad.

The medical arrangements for the evacuation of wounded of this action were as follows: No. 131 Cavalry Field Ambulance and several other field ambulances were grouped below Bawi on the left bank near the pontoon bridge to receive casualties from the fighting on the Diyala, while No. 128 Indian Field Ambulance was opened on the right bank along with three sections of No. 19 British Field Ambulance and No. 130 Indian Field Ambulance. No. 20 Combined Field Ambulance of the 14th Division accompanied the 35th Brigade and opened at an advanced position, throwing out an advanced dressing station nearer the fighting line.

On the right bank casualties were brought back to the field ambulances by their own ambulance transport, and all were collected at No. 128 Indian Field Ambulance situated near the river. Assistance was given in this work by some of the cars of No. 33 M.A.C. From No. 128 Field Ambulance the wounded were brought back to Bawi by river. Two hospital steam launches and a tug with the hospital barges, "Calcutta" and "Doris," together with four other launches, worked up and down the river until all casualties, amounting to about 750, had been received at Bawi.

On the left bank evacuation was carried out entirely by land, No. 33 M.A.C. bringing all the casualties from the three field ambulances of the 13th Division and from the advanced dressing station of the 14th Division to the improvised casualty clearing station at Bawi. The various ships which brought up supplies and which had medical personnel and nursing sisters on board, evacuated the cases from Bawi to No. 19 C.C.H. at Aziziya. The evacuation was seriously impeded

by a gale which blew on both 9th and 10th March, making the return journey of the various vessels slow.

Advanced general headquarters moved off by river from the neighbourhood of Bawi at 8.30 a.m. on 11th March. The ship on which it was on board steamed straight into Baghdad, and arrived off the British Residency at 4 p.m.

No. 20 Combined Field Ambulance of the 14th Division was at once opened in the Turkish military hospital and attended to the large number of wounded Turks in that vicinity, while one section of No. 40 Field Ambulance performed the same duty in the British Residency in Baghdad. When the patients were dressed and cleansed they were sent in groups by various ships to the base. In a few days all had been evacuated except about 100 infectious cases which were collected together in the Jewish hospital, used as an infectious hospital.

General view of Baghdad.

Nos. 15 and 16 C.C.Ss. were ordered up to Baghdad and opened on the left bank of the river close to the supply, ordnance and engineer depôts where the supply ships unloaded. The hospital launches and steamers continued to bring the sick and wounded from the field ambulances to the casualty clearing stations.

The number of sick and wounded evacuated from the Ist and IIIrd Corps between the 16th February and the 11th March 1917 was 30,675.

The Medical Arrangements on the Lines of Communication.

While the Ist and IIIrd Corps were thus advancing on Baghdad, Shaikh Saad remained the main centre of evacuation. An isolation hospital, established by a detachment of No. 61 Indian Stationary Hospital was added to the hospital accommodation there and opened on the bend of the river downstream

running north and south. As no buildings were available at Shaikh Saad, all the hospitals were under canvas in European pattern tents. The ordnance and supply dumps, divisional dumps, rest camps, medical reinforcement camps, convalescent depôts, and the termination of the light railway, which ran from Shaikh Saad to Twin Canals and eventually on to the Hai, were all at Shaikh Saad.

A railway siding had been constructed at the hospitals in November 1916 and the patients from the front were thus brought direct to the hospitals by rail. The evacuation of patients down river from Shaikh Saad was carried out by

Transporting troops on the Tigris.

ordinary river boats and the H.S. "Sikkim." The medical staff on board the river boats had been increased, all the larger boats having two medical officers and two nursing sisters on board. Everything was done for the comfort of the patients on board. This was especially so on the new type of river boats which had arrived in the country—the "P.50" class—of which five were used between Shaikh Saad and the base. On the journey up-stream they carried troops and stores. When they arrived at the advanced base, the medical service had the prior claim and if they were wanted for the evacuation of casualties they were thoroughly cleansed by the embarkation medical officer's staff and berthed at hospital berths to be loaded with patients. The larger boats of this class carried 150 to 200 stretcher cases on deck

and 150 sitting cases on two barges, making a total of between 300 and 400. The number of patients evacuated from Shaikh Saad from 13th December 1916 to 15th February 1917 on the different boats was 18,874.

In addition to the hospitals there were two sanitary sections at Shaikh Saad. These supervised not only the advanced base but the various posts on the railway and river, and in addition to the routine sanitary work they established baths for British and Indians at the rest camps. A disinfecting station was organized in which clothing of men in rest camps and the hospital bedding and clothing were disinfected. It was fortunate that a bathing and disinfecting station were available, because all the prisoners of war were dirty and lousy and many were suffering from infectious disease, especially those, as already noted, who were captured on board the " Basra."

CHAPTER XII.

THE MEDICAL SERVICES DURING THE OCCUPATION OF NASIRIYA, 1916–17.

AFTER the occupation of Nasiriya, on the Euphrates, in 1915, as described in Chapter VI, the 12th Brigade and some details under Brig.-General Brooking had been left to garrison that district of Lower Mesopotamia. The general situation was peaceful until the 7th January 1916, when a demonstration was made at Buttaniya, twelve miles north-west of Nasiriya in the direction of Shatra. The object of this demonstration was to draw off some of the enemy from the Tigris front while attempts were being made to relieve Kut. On the 14th January a force of 3,000 Arabs attacked the British detachment at Buttaniya. The detachment lost 26 killed and 36 wounded. On the 7th February the small force there, under Brig.-General Tidswell, withdrew from Buttaniya, and during its retreat it was attacked by 5,000 Arabs. The force had to fight its way into Nasiriya. The enemy's loss was estimated at 1,000, while General Tidswell's column lost 148 killed and 225 wounded. The ground was heavy owing to the mud caused by the rain, and the wounded were either carried on stretchers or evacuated on riding mules. On the 9th February Brig.-General Brooking moved out from Nasiriya with a small punitive force. The medical arrangements were makeshift, but all the wounded were brought into Nasiriya.

As already noted, in the spring of 1916 it was decided to increase the force at Nasiriya, and the 15th Indian Division was formed on the 7th May 1916. The division was composed of the 12th, 34th and 42nd Infantry Brigades and divisional troops. The troops were distributed over a considerable area. The 34th Brigade was stationed at Khamisiya and had posts at Hakika, Junction Camp, about 3 miles west of Suk, and Suk. The headquarters and the remainder of the division occupied both banks of the Euphrates at Nasiriya.

The problems which presented themselves to the medical staff differed materially from those on the Tigris, as here there was no Turkish enemy in the immediate vicinity of the British force. The force, however, was separated from Basra base by a long line of water communications, and from the main force

on the Tigris by the desert lying between the Euphrates and the Tigris. While this division protected the left flank of the Tigris force and prevented a Turkish advance down the Euphrates, its main duty was to keep the local hostile Arab population, especially the truculent Muntafik tribes, in order. It acted in fact as an army of occupation. The chief objects which the A.D.M.S., Colonel Irvine, had in view were to preserve the personnel in good health and to train the medical units, reorganize them, and bring them up to war establishment strength, and to assist in the co-operation between the different branches of the service.

The divisional area of the occupied country lay round a triangular nucleus at the corners of which stand the towns of Nasiriya, Suk-esh-Sheyuk and Khamisiya, while along its north side the Euphrates flowed from west to east till at Suk it divided into two channels, the old channel continuing eastward through the Hamar Lake to form with the Tigris the Shatt-al-Arab at Qurna, and the new channel turning towards the south past the town of Suk to flow into the Shatt-al-Arab at Ghurmut Ali. In this area of flat alluvial soil it was the river and its creeks alone which constituted the natural features of importance. The river winds through the country in a broad shallow bed, which it scarcely fills in the low water season and from which in flood time, except where there is a well constructed embankment it overflows over the surrounding country to a depth of several feet. The creeks vary in size. Some are capable of floating a large bellum and may extend for twenty miles ; others are short narrow ditches running a few yards inland from the river or their parent creek. They serve the combined purpose of irrigation and drainage for large tracts of country. The larger creeks never dry up entirely, but the smaller ones are empty towards the end of the hot weather. The Hamar Lake on the boundaries of the area was about twenty square miles in extent and was the great bar to a regular service of river boats between Basra and Nasiriya. In the flood season it is never deeper than from 8 to 10 ft., and sometimes in the low water season the actual channel has a maximum depth of 16 inches. The marshes cover an area at least as great as that of the lake. They are large tracts of ground covered with bulrushes, reeds and other water plants, and traversed by numbers of creeks of different sizes which, connecting the Arab villages perched on the scattered islands of dry, firm soil, form the highways in this amphibious district.

The Itabiya creek, which is about fourteen miles long, is the route to Khamisiya. At first the creek traverses the cultivated river zone, then it becomes itself the centre of a stretch of irrigated land reclaimed from the reeds. At the post of Omm-al-Wadir it enters a marsh and runs through reeds 10 feet in height till just over a mile from the town of Khamisiya, where it emerges on to the desert and runs in an artificial cut, ending where the 34th Brigade camp was established. The desert presented few points of interest. North of Nasiriya were two lines of sandhills which served the double purpose of forming a natural dam to keep off the floods and of acting as a frontier against the hostile tribesmen of Shatra and the neighbourhood.

Between Suk and Nasiriya the ground is very fertile, producing heavy crops of vegetables and fruit. There are the usual two seasons—the hot and the cold weather. The former commenced about 15th May and came to a close about 15th November. The main features of the hot weather were high day temperatures with comparatively cool nights, the variation between the maximum and minimum of the twenty-four hours being from 30 to 40 degrees. During June and July, owing to the country on either side of the river being flooded for several miles, the air was laden with moisture, and this, accompanied by high temperature and absence of breezes, made the climate very trying. The maximum temperature was recorded on 18th July 1916, the thermometer registering 123° F. in the shade. A dust storm the following day gave a little respite but the maximum did not fall below 120° till 30th July, when a belated north wind set in. During August the maximum did not exceed 115° and the minimum, except on three occasions, was not more than 75° ; a fitful north wind blew during the month. During September and October the temperature remained high, and up to 20th November the maximum was over 85° F. The cold weather was mild and bracing, and from 1st December to 1st April was ideal for British and Indian troops.

Colonel Irvine, the A.D.M.S. of the division, with a very complete knowledge, when D.D.M.S. of the Tigris Corps, of what the force on the Tigris had lacked, and feeling that inefficiency from sickness was the problem that was most pressing, made a very careful survey of the conditions prevailing at Nasiriya. Recognizing that the force was not a mobile one but an army of occupation, he prepared elaborate reports for the information of the G.O.C. of the division and asked for

extra personnel, units and appliances, outside the scope of the war establishments of a division. In his first report he laid stress on the importance of a pure water supply and drew attention to the lack of material and the haphazard methods of water purification then in vogue in the area. He desired to establish a dairy so that hospital patients and troops should benefit by a pure milk supply, and he wanted additional medical units so that the field ambulances of the division could be cleared of their sick, no longer act as improvised stationary hospitals but revert to their proper function as mobile units. He advised the formation of a convalescent depôt, convoys for the evacuation of sick, the establishment of a laboratory, the opening of an advanced depôt of medical stores, dental and ophthalmological departments and the provision of medical personnel for the civil inhabitants of Nasiriya. He was dissatisfied with the sanitary methods adopted in the division and pointed out how these could be improved. It was perhaps natural that at first these proposals were not entertained. The reasons were simple. Many of the new divisional staff had been drawn from India and others had not seen the disasters that had occurred on the Tigris and had little or no experience of the modern conditions under which British troops were fighting elsewhere and were therefore not very sympathetic. The extra units and personnel were considered at that time to be unsuitable for a division.

When the division was formed, the medical units available were one British section and two Indian sections of No. 3 Combined Field Ambulance, No. 19 Combined Field Ambulance and No. 23 Combined Field Ambulance. The last had arrived with the 42nd Brigade on 10th May 1916. No. 3 Combined Field Ambulance had taken part in the operations on the Euphrates in July 1915 and since then it had been split up, one British section and two Indian sections remaining at Nasiriya while the other British and Indian sections had been despatched to the Tigris and had taken part in the unsuccessful operations for the relief of Kut. The sections at Nasiriya, prior to the formation of the division and up to the time a combined stationary hospital, No. 83, arrived on 14th June 1916, had endeavoured to combine the functions of a field ambulance and stationary hospital. For this purpose reed huts had been built in which the patients were accommodated. On 9th June 1916 the two sections from the Tigris rejoined their unit and on the arrival of the combined stationary hospital the huts and the patients of this field ambulance

were handed over to the newly-arrived unit, and No. 3 Combined Field Ambulance resumed its normal work as a mobile unit and collected sick from the 12th Brigade and divisional troops stationed on the left bank of the river. No. 19 Combined Field Ambulance was stationed at Khamisiya with the 34th Brigade and moved with that brigade to Nasiriya in January 1917. Owing to the difficulties of evacuation from Khamisiya, this combined field ambulance had to act as a stationary hospital and treat and retain for considerable periods the sick from the brigade. The British sick were accommodated in four reed huts and in European pattern tents and the Indian sick in European pattern tents. The monthly average of sick admitted to this unit for July and August was 110, September 150, October 180 and November 220. The number of admissions was only kept down by treating a considerable number of sick in regimental aid posts and not showing them as admissions to hospital. No. 23 Combined Field Ambulance was detailed to clear the sick from the 42nd Brigade and divisional troops encamped on the right bank of the river at Nasiriya. From the 1st December 1916 this unit took in only British sick and the patients were accommodated in reed huts. No. 105 Combined Field Ambulance arrived in the divisional area on 30th July 1916 and was encamped on the right bank of the river. During August the ambulance personnel built very commodious and comfortable huts and the unit was opened for Indian sick on 1st September 1916. It could not be used at this time for British sick as it was only a combined field ambulance in name. Its reorganization with personnel for British patients had not taken place. No. 108 Combined Field Ambulance arrived in Nasiriya on 7th July 1916. This unit had taken part in the campaign in Gallipoli and on its arrival in Mesopotamia it had been used on the Tigris principally to form convoy parties. It, too, was a combined field ambulance in name only, as it was originally an Indian field ambulance. Its reorganization was completed by transferring to it one British section from No. 3 Combined Field Ambulance. It was not used as a unit until 1st January 1917 as its personnel was used to reinforce No. 83 Stationary Hospital. On the 1st January 1917, No. 3 Combined Field Ambulance was closed down and No. 108 Combined Field Ambulance took over its duties. No. 83 Stationary Hospital was intended to accommodate 50 British and 150 Indian sick but it usually had to take in from 400 to 500 patients. A detachment of this unit was sent to Junction Camp on 28th July 1916 for the reception of sick from river posts and

for the accommodation of patients in the sick convoys passing through to the base from Khamisiya.

Early in August 1916 a proposal to convert the Turkish barracks into hospital wards for the stationary hospital was submitted to the G.O.C., who agreed to the proposal. There was considerable delay in the converting of this building into a hospital. The troops were not evacuated from it until 1st November and despite the fact that work on the hospital had not been completed, the cold of December made the immediate occupation of it necessary, and patients were consequently moved into the barracks on the 15th of that month. The army bearer corps personnel of the field ambulances rendered invaluable assistance to the Royal Engineers in levelling the

The Euphrates river near Junction Camp.

ground floors, putting down floors of broken brick, and making roads and sites for tents. The inside walls were plastered and whitewashed and the ceilings were covered with white cloth ; doors and windows were fitted ; cookhouses, baths and sanitary appliances were erected and an operating theatre was constructed. A dental department, X-ray department and a well equipped laboratory were opened and what had been at one time an unattractive Turkish barracks developed into a first-class hospital. On 8th December 1916 sanction was given for this unit's expansion to a 600-bedded hospital with the equipment of a general hospital. It opened an isolation section and infectious cases were treated in it—at first only British but subsequently both British and Indian. The patients were accommodated in large marquees which made good airy wards in the cold weather

but were much too warm in the hot weather and as fans were not available and punkhas unsatisfactory, cases prostrated by cholera and other infectious diseases had little or no chance of rapid convalescence. No. 27 C.C.S. arrived at Nasiriya on 13th January 1917 and took over the site evacuated by the stationary hospital when it moved into the Turkish barracks.

The evacuation of casualties from the date on which the division was formed to the middle of January 1917 was a problem always difficult to solve, as shallow draught steamers could only reach Nasiriya during the flood season of May, June and July. After this date steamers could only be used between Nasiriya and Junction Camp and Chabaish and Basra. The channel across the Hamar Lake was difficult to navigate and could only be crossed for eight months of the year by flat-bottomed native craft. A fleet of ten mahelas was put at the disposal of the medical staff and they were converted into ambulance craft.* It was at first intended that these mahelas should be met by river steamers at Chabaish and that the patients evacuated from the 15th Division should be off-loaded and transferred to ships at that point. Very often the river steamers from Basra did not meet the mahelas at Chabaish ; occasionally they did not meet them even at Qurna and the convoy had sometimes to sail from Nasiriya to Basra, a distance of 130 miles, and if the wind was unfavourable this journey took as long as ten days, the craft often becoming separated and the Arab crews at times unruly. The difficulties of the medical personnel accompanying the convoys were consequently often great, and the trials the sick underwent were such as to make the medical officers deliberate very carefully on the class of case to be evacuated. The difficulties which the 15th Division experienced in evacuating casualties at this time taught the whole division important lessons which were applied in considering the problem of evacuating wounded in the preparations for subsequent operations.

With the gradual approach of the railway which was constructed across the desert from Basra to Nasiriya through Khamisiya, the problem of evacuation was simplified and the construction and supply trains were at once used for evacuating cases. On 17th January 1917 a fully equipped ambulance train which had been built in India reached Nasiriya and evacuated cases to Basra in from eight to ten hours.

Apart from treating casualties resulting from the occasional raids on Arab villages and reconnaissances up and down the

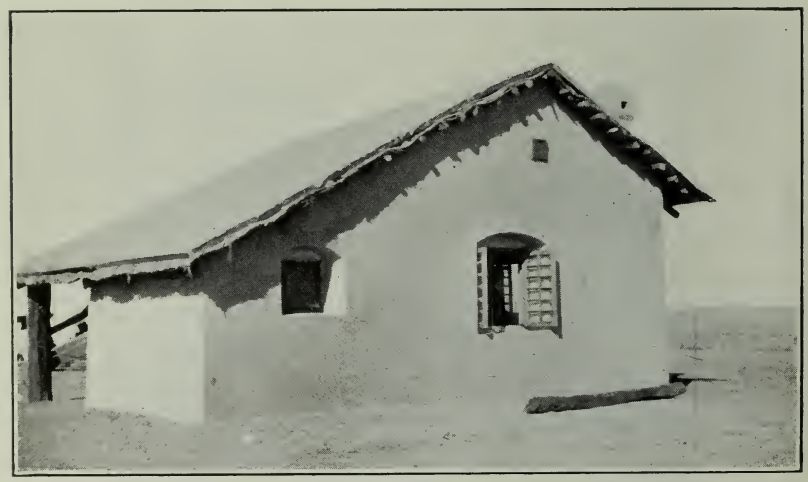
* *See* Chapter XXIII.

river, the medical units were only called on once to take part in actual operations. It had been known for some time that the hostile Muntafik Arabs were gathering in force north-east of Nasiriya and the action of As Sahilan took place on 11th September 1916. A definite date had been fixed for this, and the troops were trained for the attack. Two brigades, the 12th and 42nd, accompanied by the bearer divisions of Nos. 3 and 23 Combined Field Ambulances had made a route march every morning fully equipped for battle as a preliminary training. At 5 a.m. on 11th September, the 12th Brigade moved out with orders to

Theatre of the Queen's Regiment at Nasiriya, 1916.

attack the hostile Arabs, who had collected in force on the left bank of the river, about five or six miles north-east of Nasiriya; after a short interval it was followed by the 42nd Brigade. The G.O.C., anticipating the Arabs' usual tactics of encircling a small attacking force, purposely delayed the departure of the 42nd Brigade so as to allow the Arabs to develop their scheme. His intention was to entrap the Arabs between his two forces. The scheme was successful. The Arabs were decisively beaten and the troops were able to hold the ground and enable the British and Indian casualties—16 killed and 148 wounded—to be evacuated to No. 83 Stationary Hospital.

This was the first engagement in which the newly formed 15th Indian Division had taken part. From the medical aspect it was important not on account of the evacuation of wounded, which was defective, not on account of the number of casualties nor how they were dealt with, but on account of the fact that the G.O.C. and his staff did not inform the A.D.M.S. of the division that an action was impending or was taking place. It may be stated that at this time Colonel Irvine was on leave and that the officiating A.D.M.S. had come straight from a civil appointment in India and had no experience of military operations. The question of surprise and secrecy is all-important



Officers' mess hut, Nasiriya, 1917.

in military operations, but if the A.D.M.S. of a division gets no information he cannot make suitable arrangements for the casualties and cannot be held responsible for any breakdown in the medical arrangements. It was perhaps fortunate that this misunderstanding took place early in the history of the division, because the difficulties the General Staff experienced in evacuating the wounded demonstrated the importance of medical arrangements and allowed the different departments of the staff to consider more carefully in the future their intimate relationship. That this was so is borne out by the subsequent history of this division and the intimate co-operation that was the outstanding feature in all its subsequent operations.

From October 1916 onwards, field ambulances reverted to their original rôle and were gradually reorganized according to the schemes of the D.M.S. of the Expeditionary Force. Their personnel, equipment and transport were brought up to war establishment strength, and they took part in all brigade and divisional training. A series of lectures was given by the different staff officers of the divisional staff so as to promote co-operation and efficiency. Included in the syllabus of these lectures was one given by the D.A.D.M.S. of the division on the evacuation of casualties and the duties of the medical service.

In reviewing the diseases that affected the 15th Division the most interesting point is the fact that while divisions on the Tigris were tired out by active operations, had insufficient rations and lacked suitable tentage, here was a division of practically fresh troops, comparatively well housed, with no serious restrictions in diet, under the command of a general whose first considerations were the well-being and health of these troops, and who never missed an opportunity of encouraging concert parties, recreation or anything that tended to promote physical efficiency, and lessen the monotony of service in Mesopotamia. Another factor intimately connected with what at this period was a remarkably low incidence of disease was the amount of agricultural produce which could be obtained locally.

The average monthly percentage of sick in hospital was as follows :—

1916

June	4·85
July	5·35
August	5·99
September	6·84
October	5·91
November	4·15
December	3·25

1917

January	3·17
February	3·94
March	3·27

The admissions for the prevalent diseases during the period June 1916 to April 1917 are shown in the following table :—

Disease.	British.	Indian.	Followers.
Malaria	595	125	44
Sandfly Fever	521	—	53
Colitis	222	324	254
Jaundice	169	236	119
Suspected Enteric Group	237	—	—
Scurvy	—	219	—
Dysentery	64	43	37
Heat Stroke	62	—	—
Cholera	28	—	—
Oriental Sore	—	147	—
Pneumonia	—	53	41

The low admission rate of scurvy amongst Indians, compared with the high rate among troops on the Tigris, shows how the vegetable ration which was produced from this fertile area contributed to keep the disease in check. The question of preventing the spread of enteric fever was of importance on account of the extreme measure that had to be taken to persuade one unit to carry out a proper system of sanitation. A certain battery was frequently reported to the divisional staff for neglecting the essentials of camp sanitation. The incidence of enteric and dysentery in this unit was high. The medical Advisory Committee when visiting the 15th Divisional area was asked to inspect this unit and they reported as follows: " This battery has not only been needlessly contracting sickness with constant inefficiency but has been a very probable source of infection to other units in adjoining camps. Effective measures should be taken to put an end to this state of affairs." As a result of this report which was sent direct to general headquarters the G.O.C of the force, Lieut.-General Sir Stanley Maude, wired to the G.O.C. of the 15th Division authorizing the latter to remove the officer commanding the battery from command of his unit if the sanitation of the unit did not become satisfactory.

A feature of the divisional arrangements was the attention given to the bathing of the troops, so preventing the spread of lice-borne diseases and diminishing the inefficiency caused by skin diseases and septic sores. Extensive and elaborate bathing establishments were encouraged, and on an average 1,000 men received hot baths each day during the winter months, a state of affairs unknown at this time in any other formation either at the front or on the lines of communication in Mesopotamia.

The 15th Division was gradually withdrawn from Nasiriya in April 1917 and concentrated at Hinaidi below Baghdad. It was relieved by a Brigade sent from Basra. The troops were moved by rail to Basra and from Basra to Baghdad by road, river and rail. In June 1917 the division was moved to Karrada and the 34th Infantry Brigade was detailed to join a newly formed division, the 17th Division, on the 1st September 1917. It was replaced by the 52nd Infantry Brigade. The medical units then with the division were Nos. 23, 105 and 108 Combined Field Ambulances and No. 16 Sanitary Section. The severe heat wave, which lasted from 1st to 14th July 1917, affected the personnel of the 15th Division ; 48 cases of heat stroke were admitted in July and of these 34 were admitted during the fortnight 10th to 24th July.

The diseases which chiefly affected the 15th Division during the period April to September 1917 are shown in the following table :—

Month.	Dysentery.	Malaria.	Jaundice.	Colitis.	Heat Stroke.
	British Troops.				
April	38	6	—	—	—
May	11	19	1	1	—
June	32	33	3	1	—
July	29	32	5	—	48
August	51	25	2	1	6
September ..	100	24	2	1	5
	Indian Troops.				
April	4	—	2	—	—
May	8	3	1	2	—
June	5	1	3	16	—
July	14	4	8	1	1
August	21	3	10	1	—
September ..	88	9	7	2	—
	Followers.				
April	3	—	—	—	—
May	10	1	—	—	—
June	4	1	—	1	—
July	5	—	2	—	—
August	19	5	5	5	—
September ..	15	2	3	3	—

An epidemic of sandfly fever occurred between 8th June and 8th September 1917 and 270 cases were admitted and evacuated. The field companies of the Royal Engineers suffered most from this disease especially during the month of August and the first week in September.

CHAPTER XIII.

THE MEDICAL SERVICES AFTER THE OCCUPATION OF BAGHDAD

WHEN the Tigris Force arrived at Baghdad the 35th Brigade was detailed to maintain order and defend the city while the rest of the troops continued the pursuit of the enemy, obtained control of the railway from Samarra and the river embankments upstream from Baghdad, assisted the Russians who were advancing from Hamadan to Kermanshah and occupied Feluja to control the middle Euphrates. The 35th Brigade was subsequently relieved by the 36th Brigade.

The Medical Organization in Baghdad.

An immense amount of work had to be done before Baghdad was made suitable for occupation by the British troops. Nearly all the larger buildings had been used by the Turks as hospitals. Large numbers of their sick and wounded had been removed before the arrival of the Tigris Force, but those remaining in the Residency, the Turkish Military Hospital, the Jewish Hospital and the Red Crescent Hospital, numbering 586, had all to be cared for. Among them were some so severely wounded or so seriously ill, chiefly from typhus and relapsing fever, that they could not be moved. The sick and wounded in these hospitals, with the exception of the Red Crescent Hospital, had practically been without food for two days and arrangements were made locally to obtain milk, soup and other comforts. Difficulty was experienced at first in accomplishing this owing to the disorganization of the city. Later, when food control was organized, there was no difficulty.

The wounds were so severe and septic, and required so many extensive dressings, that a great strain was laid on the surgical material available in the field ambulances. This necessitated the immediate dispatch up the river of an advanced depôt of medical stores. All the Turkish wounded, as well as the buildings in which they were located, were in a very verminous condition. As the wounded Turks were disinfected and their wounds dealt with, they were transferred down the river in batches. In a short time all were evacuated except those suffering from infectious diseases, who were detained until free from infection.

A general survey of the whole of the city was made with a view to selecting suitable buildings for the hospitals. It was considered that 4,000 hospital beds and 3,000 beds in the convalescent depôts would be sufficient for the force at and around Baghdad, as the new hospital ships were specially constructed for carrying patients during the hot weather, and could transfer sick in two to two and a half days to Amara, which was then regarded as the base hospital area for the Tigris Force. For this purpose the Turkish Military Hospital was selected for No. 23 British Stationary Hospital and it was estimated to be capable of accommodating about 500 beds. This building was occupied as soon as it was disinfected and thoroughly cleaned. No. 20

Turkish building used as a hospital in Baghdad.

Combined Field Ambulance of the 14th Division was located there to make the preliminary preparations and to take in sick and wounded until the arrival of the British stationary hospital from Amara. The Clock Tower Barracks and the adjacent military school were capable of providing accommodation for No. 31 British Stationary Hospital and No. 70 Indian Stationary Hospital. These buildings required more extensive preparations ; but it was decided that patients could be accommodated as soon as the buildings had been cleaned and the personnel of the hospital arrived. The necessary alterations were to be carried out later by degrees. The cavalry barracks could accommodate 1,000 patients and this building was allotted to No. 61 Indian Stationary Hospital. The barrack rooms after disinfection and cleansing were able to take in 400 cases, but considerable work was necessary in order to make the remainder

of the buildings available for patients. The Jewish Hospital, capable of holding 150 patients, was allotted as an isolation hospital.

A large house on the right bank of the river, called Kasim Pasha House, was allotted as an officers' hospital of 100 beds, and some detached houses, situated a little way down near a bend of the river and catching the river breezes blowing from the north, were detailed as an officers' convalescent depôt. In addition to these hospitals the army commander desired accommodation for 1,000 extra beds in huts, and a site for this hutted hospital was selected.

Five casualty clearing stations were also ordered to Baghdad, and were eventually established in the area. They were accommodated in tents protected by grass mats. It was decided that three convalescent depôts, each capable of accommodating 1,000 men, should be opened.

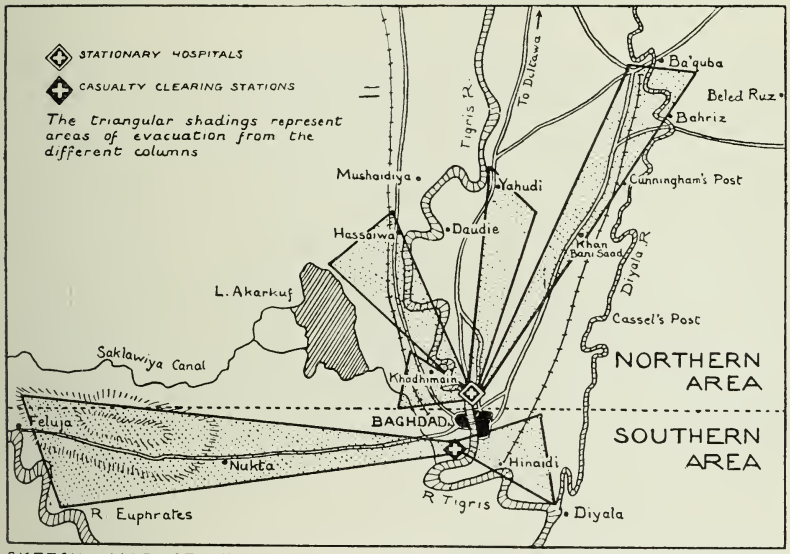
The Turks before leaving had destroyed a great number of buildings, and had threatened a massacre of the people, and the Arabs and Kurds had taken this opportunity to loot the city freely. The majority of those employed in sanitary duties had fled, and the streets and houses were rapidly becoming filthy. It was necessary to adopt some system of sanitation without delay.

A scheme for the sanitary control was at once established, and on the arrival of the military governor with his staff was in full working order. The city was divided into six sanitary areas—four on the east side and two on the west side of the river. Each area was placed under an inspector, and each inspector had control over several sub-overseers each with a gang of ten sweepers and donkey boys. The total number engaged was 500. This personnel was gradually collected when the Arabs gained confidence in the British occupation and returned to the city. The men employed in this sanitary service were numbered individually and wore a distinguishing yellow brassard. Their duties were to cleanse the streets and remove all filth and rubbish by means of hand carts and donkeys to dumps outside the city, where incineration might eventually be carried out.

A medical officer was appointed civil surgeon for the city. He established an office from which all public health work was controlled, and where all sanitary details such as notification of disease and registration of burials were recorded. The prostitutes were confined to a quarter which was placed out of bounds to the troops. Stations were established for the

chlorination of drinking water, and some form of food control was established in the bazaar. Subsequently, No. 46 Sanitary Section was ordered up to Baghdad from Basra and placed under the orders of the civil surgeon. The personnel of this unit controlled the local labour and established a gang of workers to cleanse existing middens and to erect public latrines and incinerators.

A scheme for evacuating casualties from Baghdad and the surrounding neighbourhood was arranged, and the area was divided into northern and southern divisions. The British and Indian hospitals opened in the cavalry barracks, military



SKETCH MAP OF THE SCHEME OF EVACUATION OF SICK AND WOUNDED TO BAGHDAD, MARCH 1917

hospital and infantry barracks received cases from the field ambulances in the former division. Cases from the latter division were evacuated to the casualty clearing stations at the advanced base. From these groups of hospitals the patients were evacuated direct to the base hospitals at Amara by hospital steamers.

For the purposes of this scheme, the casualty clearing stations at the advanced base acted as stationary hospitals, but each casualty clearing station was organized so that its first echelon could move off at six hours' notice.

Cases of sickness likely to recover in 48 hours were treated in the field ambulances ; cases likely to recover in from two to

seven days were treated in the corps convalescent depôts ; cases likely to extend from seven to twenty-one days were sent to the hospitals in the northern and southern areas, and any patient not likely to recover within three weeks, and who could be moved, was transferred to the general hospitals at Amara.

No. 19 Combined Clearing Hospital, now known as No. 19 C.C.S., passed through Baghdad on 5th March 1917, having left a detachment at Aziziya.

On the 11th March, after general headquarters arrived, orders were issued for the medical units to be sent up to Baghdad in the following order : No. 16 C.C.S., Nos. 5 and 6 Advanced Depôts of Medical Stores from Arab Village and Shaikh

Types of hospital steam launches on the Tigris.

Saad respectively ; the motor repair workshop of No. 33 M.A.C. ; the bacteriological barge from Shaikh Saad ; No. 15 C.C.S., No. 46 Sanitary Section, No. 23 British Stationary Hospital and No. 70 Indian Stationary Hospital, both from Amara ; Nos. 31 British and 61 Indian Stationary Hospitals from Shaikh Saad, leaving a detachment at Shaikh Saad for local work. No. 20 C.C.S. was ordered to close and be ready to move.

The hospital steam launch " Kamala " was detailed to collect cases from the field ambulances stationed up the river. The " Basanta " was detailed to collect cases from units stationed down the river as far as the Diyala. Two launches were placed at the disposal of the D.D.M.S. Ist Corps for local use in Baghdad.

The Medical Arrangements during the Operations for the Consolidation of Baghdad.

The Turkish force after retiring from Baghdad, had established rearguards at Hassaiwa and Mushaidiya on the right bank of the Tigris and at Deltawa and Ba'quba on the left bank, and orders were issued for the 7th Division (Ist Corps) to attack Hassaiwa at daybreak on 14th March, and for the IIIrd Corps to occupy Ba'quba as soon as possible.

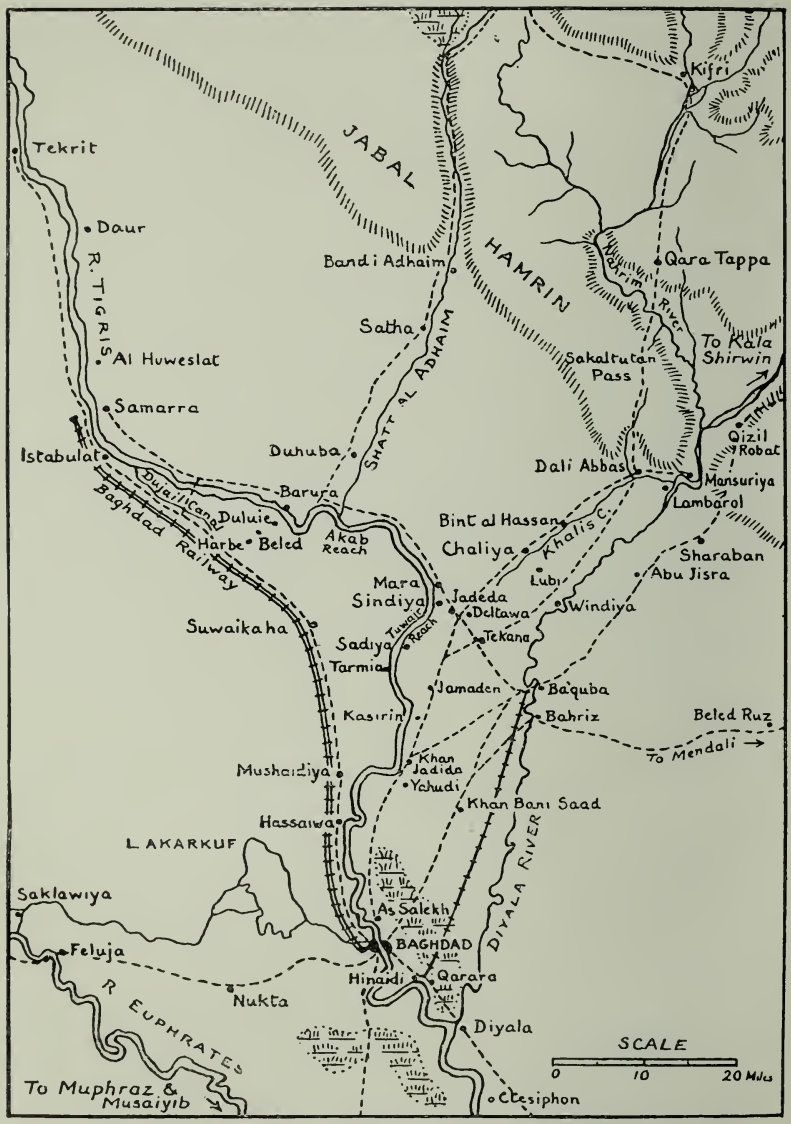
The 7th Division found the enemy in force near Hassaiwa and drove him out of his positions. The bearer divisions of Nos. 19 British Field Ambulance, 128 Indian Field Ambulance. 129 Indian Field Ambulance and 130 Indian Field Ambulance accompanied the force, and the tent divisions of those units followed up as quickly as possible. The enemy was closely followed and suffered severely. The 7th Division occupied Mushaidiya, and a gunboat advanced to Yahudie. The total casualties were 1,550, of whom 350 were collected in the advanced dressing stations on the evening of the 14th March. There was some confusion, however, in the various orders that were issued as to where the main dressing stations should be located, and it was not before the forenoon of 15th March that the wounded were received into them. Nos. 19 British Field Ambulance and 130 Indian Field Ambulance were established on the river bank as an evacuating station, and Nos. 128 and 129 Field Ambulances joined up with their advanced dressing stations as the troops advanced.

The D.M.S. had arranged that "P. 35" and the hospital steam launch "Kamala" should stand ready to proceed up river and evacuate the casualties to the hospitals at the advanced base as soon as he was informed by the D.D.M.S. Ist Corps of the probable numbers requiring evacuation, and that a suitable place had been selected on the river bank for the collection of wounded.

There was a strong gale raging all day, and this interfered with the evacuation. The hospital vessels had to make several journeys, and the strong wind against the rapid stream made the river so rough that the employment of small boats became dangerous.

An infantry brigade of the IIIrd Corps marched on 16th March to Ba'quba, via Khan Bani Saad, where a rest post was formed. By the evening the troops held the right bank of the Diyala, opposite Ba'quba, while the enemy held the town and left bank of the river. One British and one Indian section of No. 135 Combined Field Ambulance accompanied this force.

It was arranged that No. 33 M.A.C. would evacuate all casualties from Ba'quba to Baghdad. There were, however, no casualties during the advance, and the brigade received orders to occupy Ba'quba and hold the bridge across the river.



SKETCH MAP OF THE AREA OF OPERATIONS FOR THE CONSOLIDATION OF BAGHDAD

A force known as the Feluja Column was next formed, as it was understood that the Turks intended to cut the embankment on the river Euphrates in order to flood the country. This had been previously contemplated when General Townshend's force was advancing on Baghdad in 1915. The Feluja Column consisting of the 7th Brigade of the 3rd Division, and some details with No. 111 Indian Field Ambulance and two sections of No. 7 Field Ambulance were ordered to occupy Feluja and protect the dams.

The column, under the command of Brig.-General Davidson, marched on the 18th March and reached Nukta. The next day further progress was made. Some Turkish outposts were met, but they retired towards Feluja. On 20th March the column reached Feluja and found that the enemy, after partially burning the bridge across the Euphrates, had retired northwards. A small force was detached to proceed to Saklawiya to examine and protect the river dam there, if it was still intact. On 21st March, the dam was found to have been destroyed. The breach was sixty yards wide and was getting wider every day, and the water from the river was flowing all over the country.

It was ascertained that there were hostile troops at Ramadi, twenty-five miles north-west of Feluja, and that the force consisted of about 3,500 rifles, 300 sabres and 22 guns. The column consequently remained at Feluja.

The original medical orders for this column were drawn up with a view to evacuating the sick and wounded by horse transport to the "refilling point"—a position near Nukta, about twelve miles from Feluja and twenty-five from Baghdad, and the G.O.C. of the force was to wire daily to the D.M.S. the numbers for evacuation the following day. A sufficient number of motor ambulance cars were then to be sent out with the supply column to Nukta and bring back the patients to Baghdad. These arrangements were subsequently modified as the road from Feluja to Baghdad was found to be moderately good, and five cars of No. 33 M.A.C. were kept at Feluja to bring in the sick and wounded to Baghdad as required.

A column under the command of Major-General Keary was concentrated at Ba'quba by the evening of 19th March. It was ordered to advance on Shahraban. The field ambulances accompanying the force were two sections of No. 119 Cavalry Field Ambulance, No. 8 British and Nos. 112 and 113 Indian Field Ambulances. No. 135 Combined Field Ambulance and two sections of No. 7 British Field Ambulance

were opened at Ba'quba as improvised casualty clearing stations. Ten ambulance cars from No. 33 M.A.C. were detailed to accompany the column to supplement the field ambulance transport, and ten other cars belonging to this convoy were posted at Ba'quba to evacuate cases from Ba'quba to Baghdad. Several Ford motor vans also accompanied the column, and instructions were issued that these were to be utilized for bringing the slighter cases to Baghdad when returning empty. The column entered Shahraban on the morning of the 23rd March 1917.

The evacuation of sick and wounded was accomplished without difficulty, despite the fact that the field ambulances at Shahraban were 25 miles from Ba'quba. All casualties were sent to No. 135 Combined Field Ambulance at Ba'quba and the cars of No. 33 M.A.C. supplemented by a few from the field ambulances were able to transfer them by road to the hospitals in Baghdad.

News was received that the Russians had driven the Turks out of Pai Tak Pass and were marching on Kasr-i-Shirin and it was anticipated that the enemy was bringing down a force of 4,800 men with 24 guns on the left bank and 200 men on the right bank of the Tigris from Samarra towards Deltawa; and another force of about 2,650 men with 10 guns from Dali Abbas, with the intention of holding the British and allowing their troops, in retreat before the Russians, to pass across the country from Khanikin to Shatt-al-Adhaim.

Orders were therefore given for the cavalry to concentrate at Ba'quba and then to proceed via Tekana towards Lambarol and cut off the enemy, and for the 40th Brigade of the 13th Division to move forward to Tekana and Deltawa. The intention was for Keary's Column to hold the enemy at Qizil Robat and prevent his breaking west across the river Diyala towards Dali Abbas; for the Cavalry Division to move towards Lambarol and Dali Abbas to secure the bridges at these points; for two infantry battalions to be in readiness to move north-east towards Lambarol if necessary and for the main body to be attacked about Mara by the IIIrd Corps.

On 25th March the 9th Infantry Brigade belonging to Keary's Column made an attack on the enemy's entrenched positions at the Jabal Hamrin. The enemy held a strong position on the main ridge and counter-attacked the 9th Brigade in force; there was heavy fighting and at 2 p.m. the 9th Brigade was ordered to retire. By evening all the troops had returned to their original position. During the fighting

the bearer divisions, reinforced by parties from the 8th Brigade, did very good work as they had to carry the casualties across a fully exposed gravel slope to a ridge 2,000 yards back and then carry their patients another 2,000 yards to the wagon rendezvous. Several attempts had been made to send the wheeled transport forward but each time they were heavily bombarded. At dusk, however, the wagons and ambulance cars were ordered forward. In all, 613 casualties were collected. On the night 31st March/1st April the enemy retired from his position and the 8th Infantry Brigade took the main crest of the hills. Additional arrangements had to be made for the evacuation of the 613 wounded at the Jabal Hamrin.

Fortunately all the cars of No. 33 M.A.C., together with some cars from the field ambulances of the Ist Corps, had been placed at the disposal of Keary's Column and it was found that the height of the river rendered navigation of the river Diyala possible. A stern-wheel steamer had been sent up with supplies and was due at Ba'quba at 9 a.m. on 26th March. Orders were issued for the slighter cases with sufficient medical personnel and equipment to be embarked after the vessel had been unloaded, and brought back to the casualty clearing stations at Baghdad. The hospital stern-wheeler "Sikkim" which had arrived at Baghdad from Shaikh Saad at midday on 25th March was also ordered to proceed up the river Diyala at daybreak on 26th March, and arrived at Ba'quba at 5.20 p.m., having accomplished the journey of sixty-four miles in twelve hours. Patients were embarked immediately after its arrival and the return journey with 95 British and 115 Indians on board was commenced early next morning.

The arrival of these two steamers at Ba'quba was most opportune. All the ambulance cars could then be used for evacuating cases from the field ambulances to the place of embarkation.

In order to assist the evacuation by river the hospital steam launch "Kamala" with a tug and the hospital barges "Calcutta" and "Doris" were also dispatched to Ba'quba. Evacuation was finally completed on 28th March. The total number of sick and wounded evacuated from Keary's Column between 19th and 29th March 1917 inclusive was 1,039.

The medical arrangements for the operations carried out by the Cavalry Division at Lambarol and Dali Abbas and by the 13th Division of the IIIrd Corps at Mara were as follows: No. 119 Cavalry Field Ambulance, with half No. 131 Cavalry Field Ambulance, accompanied the Cavalry Division; Nos. 39,

40 and 41 Field Ambulances accompanied the 13th Division. On 23rd March this division, which had concentrated at As Salekh, began to advance up the left bank of the Tigris towards Kasirin and Deltawa. Evacuation was carried out by No. 33 M.A.C. from divisional field ambulances to As Salekh, and thence by hospital ship to the casualty clearing stations at Baghdad. On arrival at Kasirin, and positions in front of it, Nos. 39 and 40 Field Ambulances were opened at Jamaden and Jadeda. All casualties were transferred from these field ambulances to No. 40 Field Ambulance at Kasirin, and from there by hospital steamers to the casualty clearing stations in Baghdad.

On 28th March the enemy was found at Bint-al-Hassan with advanced troops at Lubi and Chaliya, on the left bank of the Tigris, and it was believed his forces were assembling near Mara, on the left bank, and at Suwaikaha, on the right bank. On this date there were eighteen motor ambulance cars with the field ambulances of the 13th Division in addition to the cars with the cavalry field ambulances and twenty-eight of No. 33 M.A.C. This made a total of about sixty ambulance cars available to bring casualties from the field ambulances to Kasirin.

The paddle steamer, " P.35," had been sent up to Kasirin to evacuate all the sick that had been collected in the field ambulances before the operation began. Unfortunately, it ran on a mud bank on the return journey and did not reach Baghdad until 30th March, when after unloading the sick it returned to Kasirin. A hospital steam launch and the " Sikkim " were sent up to Kasirin immediately it was known that " P.35 " had grounded.

On 29th March the 13th Division got in touch with the enemy near Mara, a few miles upstream of Sindiya, and immediately attacked his position. The attack was successful; the enemy suffered severely and retired beyond the Shatt-al-Adhaim.

It was reported soon after the action that 100 wounded had been transferred to Kasirin by motor ambulance transport and that about 400 more, together with 59 wounded Turks, had still to be brought in. They were all evacuated by the river steamers by 1st April, and the field ambulances at Jadeda, Kasirin and Ba'quba were then cleared of their sick and wounded.

The distances over which casualties had to be evacuated are shown in the following table :—

	Miles by Road.	Miles by River.
From Ba'quba to C.C.S. at Baghdad	32 ..	64
,, Jabal Hamrin to Ba'quba	36 ..	—
,, ,, ,, ,, Baghdad	68 ..	100
,, Baghdad to Hassaiwa	— ..	20
,, ,, ,, Kasirin	28 ..	40
,, ,, ,, Sindiya	— ..	50
,, ,, ,, Jadeda	40 ..	—

The number of sick and wounded admitted to medical units from the Ist and IIIrd Corps and Cavalry Divisions during these operations from 12th March to 3rd April 1917 inclusive, was 37,407.

On the 3rd April 1917 preparations were made to attack the enemy forces holding the area Kala Shirwin-Kifri-Mansuriya-al-Jabal, Shatt-al-Adhaim, Duluie-Beled, and advance on Samarra. On the evening of the 5th April, a column composed of the Cavalry Division and the IIIrd Corps was placed under the command of Lieut.-General Marshall, the G.O.C. of the IIIrd Corps.

It was known as Marshall's Column, and assembled in the area Deltawa-Mara-Sindiya. The 7th Division of the Ist Corps was to assemble in the area Sadiya-Suwaikaha-Tarmia, on the right bank of the Tigris, at the same time, under Major-General Fane, commanding the 7th Division, and was designated Fane's Column.

The medical arrangements were for No. 19 C.C.S. from Aziziya to open at Sindiya on the left bank of the Tigris. Four ambulance launches were detailed to evacuate casualties by river from the field ambulances to the casualty clearing station and fifteen motor ambulance cars from No. 33 M.A.C. were posted at Sindiya to collect casualties from troops operating inland. On the right bank a field ambulance of the 7th Division was detailed to function at Tarmia as a casualty clearing station; thirty-five motor ambulance cars of No. 33 M.A.C. were attached to it. The evacuation from both Sindiya and Tarmia to Baghdad was to be carried out by three of the hospital steamers. No. 135 Combined Field Ambulance formed for Marshall's Column an improvised casualty clearing station at Kasirin, through which all the casualties from the cavalry and infantry divisions of the column passed. As soon as this improvised casualty clearing station was opened on 4th April, the field ambulances of the 13th Division then moved forward and rejoined their division.

The positions held by the enemy against the advance of Marshall's Column at this time were the Jabal Hamrin hills

about Dali Abbas, and the left bank of the Adhaim river near its junction with the Tigris. As the column operated along the left bank of the Tigris, the field ambulances were cleared of casualties by the motor ambulance launches to No. 19 C.C.S., which had opened at Sindiya on 7th April. This system worked extremely well, and the water-borne transport added much to the comfort of the sick and wounded. On 10th April the enemy made a demonstration from Dali Abbas towards Deltawa, and the scene of operations changed from the Tigris river bank to the area between these two places. During these operations the temperature suddenly rose; drinking water in the locality was scarce and had to be brought to the men lying in the open in clear view and within close range of the enemy.

Consequently the troops suffered greatly. A number of cases of heat exhaustion occurred, but all recovered quickly under treatment. In anticipation of further cases, a supply of ice was sent from the local factory in Baghdad to Sindiya, and carried from there to the front line in returning empty motor ambulance wagons.

Evacuation of casualties was carried out by the ambulance cars of No. 33 M.A.C., assisted by the light supply vans carrying a number of sitting cases on returning from the front.

The enemy was driven back to the foot-hills of the Jabal Hamrin range, and the troops then returned to the Tigris river bank. On the 18th April the Shatt-al-Adhaim was crossed with very few casualties, who were easily and speedily evacuated by motor launches to No. 19 C.C.S.

While these operations were in progress a portion of Marshall's Column had been covering the approach to Sindiya from Dali Abbas, and the evacuation of casualties from this force was carried out by the motor ambulance cars of the 13th Division, to Sindiya.

As further operations had been decided upon, Marshall's Column was concentrated in the neighbourhood of Barura, and in preparation for an advance either by the left bank of the Tigris or along the right bank of the Adhaim river, a reception and embarkation station, consisting of the greater portion of the tent division of one of the field ambulances of the 13th Division and two tent sub-divisions of a field ambulance of the 14th Division, was formed on the river bank and arrangements were made for the motor ambulance launches, and if necessary, the hospital steamers, to come forward to this point. Evacuation by road from Barura to Sindiya was

not feasible. The crossing of the bed of the Adhaim river was so heavy that mule teams were required to help the motor cars across the deep sand, and these would not be available if the troops moved forward. Furthermore, as the road between the Adhaim and Sindiya ran about four miles inland, the journey was dangerous on account of the bands of marauding Arabs, who would attack the convoys unless strong escorts could be provided.

On 22nd April 1917 the enemy was reported to be moving down the right bank of the Adhaim from the Jabal Hamrin range, and on the following night Marshall's Column moved forward to attack. An encounter battle with the advanced Turkish troops took place at Duhuba about 6 a.m. The enemy was thrown back ; the British losses were slight. The distance from this point to the embarkation station was about eight miles and all the casualties, to the number of about 150, including 30 wounded Turks, had been collected and evacuated by 11.30 a.m.

As the intention of the column commander was to push up to the Adhaim river and operate against the enemy's main force, which was reported to be twelve miles in front, and as heavy casualties were expected, reinforcements of motor ambulance cars were obtained from the column operating on the right bank of the Tigris. They arrived speedily and proved of great value.

The enemy's main position at Band-i-Adhaim was attacked on the 30th April, and severe fighting occurred on the left bank of the river, where the largest proportion of the casualties occurred. This necessitated the transport of wounded across the bed of the river, but by judicious use of various forms of ambulance transport and a certain amount of work to render the nullahs fit for transport, the cases were rapidly cleared to a rest station on some high ground on the right bank of the Adhaim, from which they were evacuated to riverhead by the motor ambulance convoy and empty Ford vans.

As a result of this action, the enemy fell back into the Jabal Hamrin hills and the army commander issued orders that the British troops should go into summer quarters. Marshall's Column was dispersed on the 5th May 1917, and the divisions were concentrated in their respective areas occupying a line between the Tigris and Diyala rivers from Sindiya to Ba'quba.

Fane's Column, operating on the right bank of the Tigris, attacked and captured Beled railway station on 8th April and was there joined by the 8th Brigade of the 3rd Division, when the force came under the command of Lieut.-General Cobb

and was designated Cobb's Column. This column attacked the enemy at Istabulat on 21st and 22nd April and occupied Samarra on 23rd April.

The transport available for the evacuation of casualties in these engagements consisted of motor cars belonging to No. 33 M.A.C., captured railway trucks and the ambulance vehicles of the field ambulances, when these were not engaged in clearing wounded to the tent divisions. Receiving stations were established at Beled railway station, at Harbe and later at railhead. From Beled, patients were sent by motor ambulance convoy to an evacuating station formed at Sindiya, the riverhead, where they were embarked on hospital ships and evacuated to Baghdad.

At the battle of Istabulat a complicated system of evacuation had to be arranged on account of the distance at which the force was operating from the river. During the battle the want of a casualty clearing station at riverhead was greatly felt, as all receiving stations had to be manned and equipped by tent divisions of field ambulances attached to the striking force. On the first day of the fighting there were two advanced dressing stations, one on either side of the Dujail Canal. Wounded were sent back by regimental transport carts to a combined field ambulance situated close to the railway. Casualties were there loaded on to trucks, each accommodating ten lying or thirty sitting cases. They were sent down to Beled, where one Indian field ambulance and two sections of a British field ambulance had been left. On the second day of the action the column had advanced seven miles, and the wounded were sent back by motor ambulance cars to the field ambulances near the railway. From these units the casualties were evacuated by motor ambulance convoy cars to Sindiya, where they were transferred to hospital ships. The total number of casualties was 1,900.

It has been noted in previous chapters that when a rapid advance is associated with heavy casualties and an insufficient number of properly equipped medical units to evacuate the sick and wounded from the field of battle, the patients must suffer. In a country such as Mesopotamia the discomforts which the wounded had to undergo when evacuation was delayed were increased by the climatic conditions and the thought of the marauding and treacherous Arab hordes who swarmed over the battlefield after an action had been fought.* It is important, therefore, to remember these trying conditions and

* On different occasions some of the British and Indian wounded were butchered by Arabs.

record a brigade commander's description of what some of the wounded suffered. He says:—"Surely the world offers no scene more pitiful than that of a battlefield after action. I know, by personal experience, the suffering entailed in lying day and night untended with broken limbs, the utter weariness from wounds, and the exhaustion after conflict—the tragedy of all surroundings, the cries of those who cry for help that never comes, a passionate longing for death alternating with a craven fear of foe and wandering marauder; and, above all, the horror of the great vultures swinging round and round in ever closer circles."*

At the beginning of May 1917, Cobb's Column was dissolved and the Ist Corps settled down in permanent summer quarters, the 7th Division at Samarra and the 3rd Division with one brigade at Feluja, Musaiyib and Muphraz, one brigade at Baghdad and one brigade attached to the IIIrd Corps.

Surg.-General Treherne's Administration.

While these operations in April 1917 were being conducted Surg.-General A. P. Blenkinsop took over the appointment of D.M.S. of the force from Surg.-General Treherne. He arrived in Baghdad on the 16th April. Surg.-General Treherne, before embarking for England, was instructed to inspect all the posts between Baghdad and Basra. His administration of the medical service in Mesopotamia was in marked contrast to that of his predecessor. The mistakes which had been made since the commencement of the campaign in November 1914 prepared the way for more modern organization and equipment. The Vincent-Bingley Commission, appointed to enquire into the medical arrangements in Mesopotamia, had arrived in the country early in 1916; the Medical Advisory Committee appointed by the War Office visited Mesopotamia and remained there from September 1916 to the middle of January 1917, and the War Office had taken over the control of the campaign when the state of mismanagement came to light. All these circumstances combined to guide and support Surg.-General Treherne's administrative work. Valuable advice and assistance were also obtained from the consulting physicians, Colonels W. H. Willcox and H. G. Melville, I.M.S., the consulting surgeons, Colonels Hugo, I.M.S., and T. P. Legg, A.M.S., and from Colonel M. H. G. Fell, R.A.M.C., who had been his A.D.M.S. with the Third Army in France and was the D.D.M.S. of the Lines of

* *See* "The Battle that won Samarra," by Brig.-General A. G. Wauchope. Blackwood's Magazine, April 1918

Communication in Mesopotamia. In the previous administration there had been failure to recognize the value of co-operation and initiative; no record of a clear, decisive or forcible policy had been left, and the work had been carried on without a competent staff and by improvising medical units and equipment.

Surg.-General Treherne and Colonel Fell made extended surveys a few days after their arrival in the country. They appreciated the fact that the troops were unsuitably housed and equipped, that the rations were deficient and the sanitation bad. During their tour they found ample evidence that a proper system for the evacuation of casualties had never been organized, that this was partly due to the lack of land and water transport, and reacted unfairly on the few poorly equipped medical units in the field and on the lines of communication. The result had been that field ambulances became stationary hospitals without accommodation, appliances and personnel necessary for the proper treatment of sick and wounded. The medical units on the lines of communication were in a state of chaos, and there was no D.D.M.S. to organize and supervise them.

The policy initiated by Surg.-General Treherne was to establish an efficient scheme for the evacuation of casualties; to improve the river sick convoy unit; and organize efficient medical staffs for general headquarters, the lines of communication, corps and divisions. He reorganized all medical units and increased the total number of beds available for sick and wounded from 9,425, inclusive of the accommodation in field ambulances, on 13th May 1916 to 24,190 beds, exclusive of the accommodation in field ambulances, by 30th March 1917. The hospitals, convalescent depôts, casualty clearing stations and field ambulances were brought up to modern requirements, war establishments were remodelled, and the number of nursing sisters was increased from 74 on 6th May 1916 to 329 on 1st April 1917. Provision was made for dental treatment, X-ray apparatus were established at the front, and electrical installations to supply fans and light were provided in the hospitals.

The gradual accumulation of sufficient land and river transport took time. At the time of Surg.-General Treherne's arrival in Basra only three motor or steam launches were available for the use of the medical service, and the river vessels had not been properly organized for the evacuation of casualties When he left, there were sixty-nine motor launches; motor ambulance convoys had been obtained; the river steamers had been organized for the reception of sick and

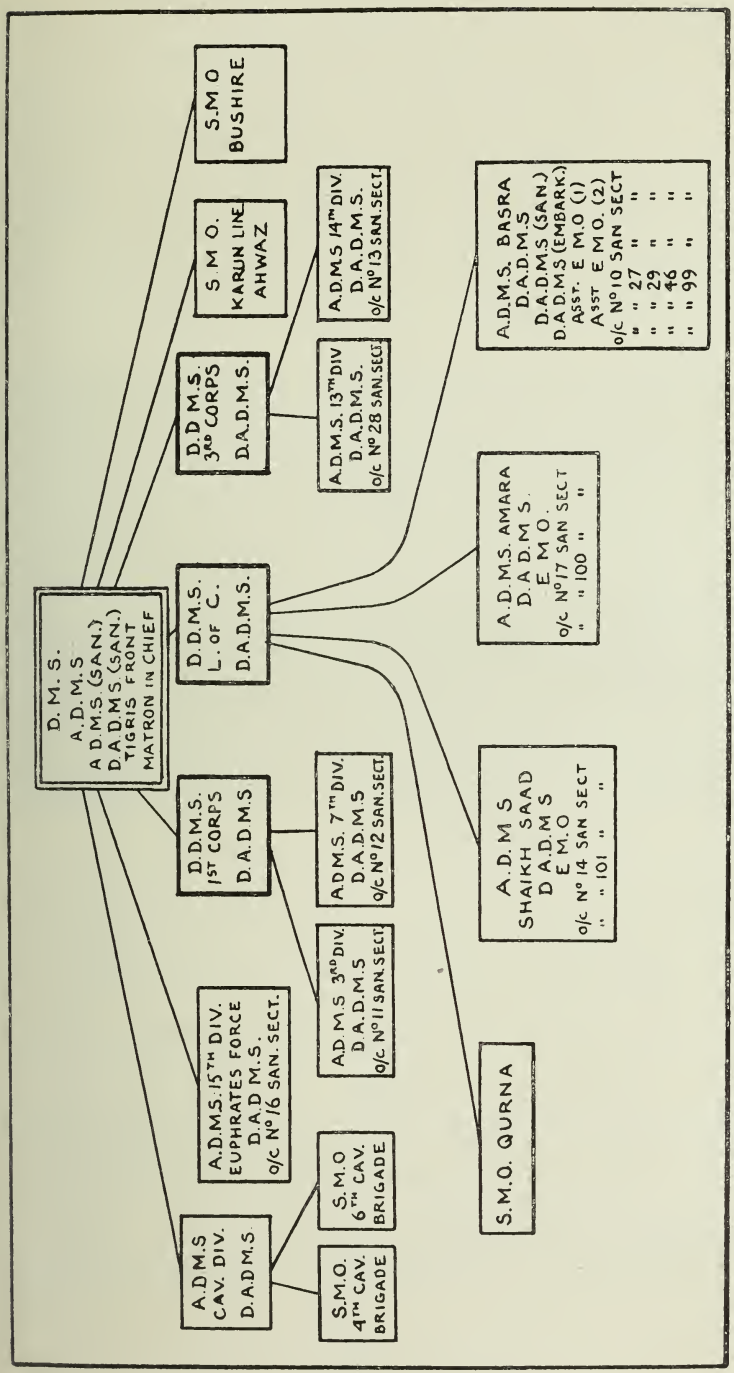
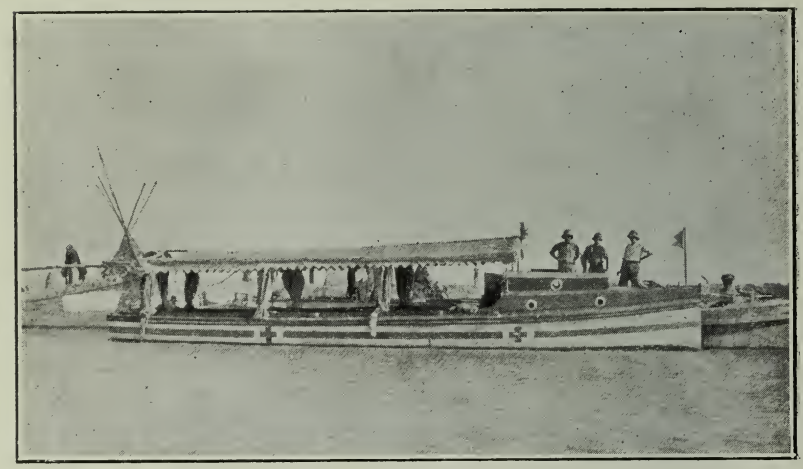


DIAGRAM OF THE SCHEME OF THE ADMINISTRATIVE MEDICAL SERVICES IN MESOPOTAMIA IN 1917

wounded, and arrangements had been made for the provision of ambulance trains. Some of these had actually arrived in the country, and others were on their way.

A comprehensive scheme for the sanitary organization of the country was also introduced.* Bacteriological methods were essential in a country such as Mesopotamia, and a complete bacteriological organization was formed.† Active measures were taken to provide an adequate supply of tentage, equipment, rations and comforts, such as ice and soda-water. The introduction of a ration suited to the needs of the country has been recorded elsewhere.‡ Surg.-General Treherne was not



A typical Red Cross motor launch on the Tigris.

satisfied that the men always received their full rations or that these were properly cooked, and medical officers attached to units were therefore ordered to pay particular attention to these points and forward weekly reports to him through the administrative medical officers of their formation. It was from information received in this way that many of the reforms in rations were instituted.

The personnel of the medical service sent to Mesopotamia had had little or no training in tropical diseases or preventive medicine. It was necessary, therefore, to establish a course

* Hygiene of the War, Volume I, Chapter I.

† Pathology Volume, Chapter I.

‡ Diseases of the War, Vol. I, Chaps. XVIII and XIX, and Hygiene of the War, Vol. II, Chap. II.

of theoretical, clinical and practical instruction in these subjects, and administrative medical officers, officers commanding units and consulting physicians and surgeons and other specialists were ordered to give lectures and demonstrations.

The medical scheme that was prepared for the advance to Baghdad was the first comprehensive effort during the campaign in Mesopotamia to demonstrate the principles of medical strategy. Although, perhaps, during the advance to Baghdad minor failures and anxieties were recorded by unit commanders when the supply of rations, comforts or dressings was running low, and the date and hour of the evacuation of casualties could not but be indefinite, on the whole the scheme worked well, considering that the rapidity of the advance was unexpected, the pursuit of the enemy brooked no delay, and the position of the D.M.S. was sometimes difficult, for he was not always consulted by the army commander regarding the movements of his medical units.

This lack of co-operation had been noted on several occasions during the operations in Mesopotamia. Fortunately, it only led to uncertainty and not to an actual breakdown in the medical arrangements during the period of Surg.-General Treherne's administration.

After Surg.-General Treherne had left, a Commission, which had been appointed under the Special Commissions (Dardanelles and Mesopotamia) Act of 1916, investigated on behalf of the Home Government the conditions of the Medical Services in Mesopotamia, taking evidence in England. The Commission came practically to the same conclusions as those of the Vincent-Bingley Commission, but recognized the improvements that had been made. The Commission submitted their report on 17th May 1917.

The Medical Situation at and around Baghdad during the summer of 1917.

During the summer of 1917, the Ist and IIIrd Corps and 15th Division from Nasiriya had been concentrated around Baghdad. The Ist Corps was spread over a large area and held the country between Samarra to Baghdad, Feluja to Baghdad and certain posts on the Euphrates. The IIIrd Corps occupied the area between the Tigris and Diyala. Towards the end of the summer the city of Baghdad and the Euphrates posts were handed over to the 15th Division, and the 3rd Division of the Ist Corps moved up the Baghdad railway to Beled, Akab and Istabulat.

The only operations undertaken during the summer were an attack on Ramadi in July 1917, and the reoccupation of Shahraban by a small mixed force on 20th August. At the beginning of July preparations were made for operations in the direction of Ramadi. A column composed of one British and two Indian battalions, a brigade of field artillery, two squadrons of cavalry, and a company of Sappers and Miners was concentrated at Sinn-al-Dhibban. (*See* Map, p. 382.) No. 111 Combined Field Ambulance, less one tent sub-division, with ambulance transport consisting of thirteen motor ambulance cars, four light and one heavy ambulance wagon was attached to it. Two sections of No. 112 Combined Field Ambulance proceeded to Feluja on 7th July, and, with a tent sub-division of No. 111 Combined Field Ambulance, formed an improvised casualty clearing station there.

On the morning of 11th July the column advanced to the Mushaid Ridge and came into action. It was in touch with the Turks east of Ramadi by 4 a.m. and by 8.15 a.m., after considerable opposition, had driven in the enemy's advanced troops and was preparing for the final assault against his main position, when a blinding dust storm sprang up, which, added to an abnormal heat wave, rendered a further advance difficult. The troops remained in their advanced position throughout the day, and were withdrawn during the night of the 11th/12th to the river bank. On the 12th July the heat wave was still increasing, but the troops still held the positions they had gained until the 14th July, when they withdrew to Sinn-al-Dhibban. They were followed and attacked by 1,500 Arab tribesmen.

The bearer division of the field ambulance went out to collect casualties when the force attacked the Turkish position, but owing to the distance and the intense heat, the men soon became exhausted, and ambulance cars were then sent forward to bring back the casualties. Luckily the ground was flat and suitable for mechanical transport, and the cars could move rapidly and avoid shell fire. About 8.30 a.m. some horsed ambulance wagons were sent out, but they at once drew artillery fire and had to be sent back to their original position. When the attack was held up, the provision of drinking water for the firing line dwarfed all other considerations. Ford lorries were loaded with pakhals and other water vessels and worked backwards and forwards between the river and the front line. By 1 p.m. 180 battle casualties and cases of heat exhaustion had been collected, and at 4 p.m. were evacuated on sixty Ford

vans to the advanced section at Sinn-al-Dhibban, where some European pattern tents had been erected. Here an evacuating station was formed by the D.A.D.M.S. of the 3rd Division. The following morning returning supply mahelas evacuated the cases to Feluja. The total casualties during the operations were 60 British and 120 Indian from wounds and 150 British and 250 Indian casualties from heat. This was the highest incidence of heat casualties during any of the operations in Mesopotamia.

By the end of September 1917 the divisions of the Ist Corps were distributed as follows: The 3rd Division had the 7th Infantry Brigade, with No. 113 Combined Field Ambulance, at Akab Reach; the 8th Infantry Brigade, with No. 110 Combined Field Ambulance, at Istabulat; and the 9th Infantry Brigade, with No. 112 Combined Field Ambulance, at Beled. The headquarters of the division were concentrated at Akab. The 7th Division had remained immobile at Samarra with its troops stationed on both banks of the Tigris. The IIIrd Corps troops were located in the Sindiya, Windiya, Ba'quba, Beled Ruz, Shahraban area. The headquarters of the corps were at Baghdad. The area occupied by the corps was the plain between the Jabal Hamrin and the left bank of the Diyala and between the Tigris and Diyala. All this country had at one time been irrigated and cultivated, but as a result of the war and local disturbances a large proportion of it had fallen out of cultivation. Along the rivers and canals date plantations and gardens were numerous; along the Beled Ruz canal the ground was marshy and rice was grown.

In September 1917 a scale of Indian personnel was authorized for the British Field Ambulances of the 13th British Division.

With a view to providing more accommodation for patients in field ambulances without increasing the weight to be carried by these units, a new system of tentage was suggested, and a committee was formed by the D.M.S. for the purpose of putting forward the most suitable scale and type for the sanction of the army commander. The following scale was approved and sanctioned. For field ambulances of the 13th Division forty-two 160-lb. G.S. tents, ten 80-lb. G.S. tents and ten 40-lb. tents, two necessary tents and two latrine screens; for the combined field ambulances of the 14th Division, thirty-two 160-lb. G.S. tents, ten 80-lb. and five 40-lb. tents, along with two necessary tents and three latrine screens. The field ambulances with the Indian Divisions were also reorganized. In the 3rd (Lahore) and 7th (Meerut) Divisions there were two British and

three Indian field ambulances, each of five sections. In the 14th and 15th Indian Divisions there were five combined field ambulances made up of one British and three Indian sections. Under the new scheme four field ambulances were allotted to each Indian division and each unit consisted of one British and three Indian sections.

The D.D.M.S. of the IIIrd Corps organized a large corps convalescent camp which was opened on 9th June and the numbers admitted gradually increased until the maximum of 750 was reached. From the time of its opening until October 1917 the numbers passed through and returned to duty were: 3,104 British other ranks, 838 Indian other ranks and 279 followers, making a total of 4,221. In this convalescent depôt large huts were built for the patients, a canteen was opened by a contractor, recreation huts were opened by the British Red Cross Society, boxing tournaments and concerts were arranged, and everything was done to keep the men fit and amused. Time-tables were made out for parades and graduated exercises, and the men were gradually trained to undertake work on discharge. The average time spent by the convalescents in the camp was about ten days, and the benefit they derived was very marked.

During the period May to October 1917 the rations supplied to all the troops were sufficient. Several cases of scurvy occurred amongst the Indian troops and for this reason the IIIrd Corps advised that the Indian ration of vegetables, which was only half that of the British troops, should be increased and that any substitute for ghi was inadvisable. The troops were well provided with clothing suitable to the climate, the only deficiency being in the issue of a number of unsuitable helmets to the British troops.

During the months of May to November, T.A.B. inoculations, cholera inoculations and smallpox vaccination were all carried out amongst the troops. The statistics of admissions for sickness between May and October 1917 from the 13th and 14th Divisions of the IIIrd Corps are shown in the table on the next page.*

The number of casualties resulting from the effects of heat is worthy of note. The majority of cases occurred between 14th and 28th July during the most trying fortnight the force had yet experienced, the temperature reaching 125° F. in the shade on the 20th of the month.

* The statistics of all the divisions have not been fully recorded but those of these two divisions serve to indicate the nature of the causes of inefficiency.

Disease.	13th Division.		14th Division.	
	British.	Indian.	British.	Indian.
Enteric	39	—	9	7
Dysentery	197	3	17	78
Scurvy	—	5	—	16
Malaria	247	16	187	223
P. U. O.	1,127	54	165	138
Jaundice	38	2	15	29
Diarrhœa	731	71	—	6
Pneumonia	14	4	—	3
Diphtheria	12	—	63	—
Beri-beri	—	—	—	1
N.Y.D. fever	489	9	115	142
Effects of heat	885	3	312	268
Mumps	—	—	3	82
Chickenpox	—	—	—	4
Colitis	—	—	1	11
Sandfly fever	1,710	2	148	34
Chancre	2	4	—	—
Venereal sores	11	2	1	5
Syphilis	2	2	4	2
Measles	—	—	—	1
Smallpox	—	3	—	—

The same conditions of temperature were experienced throughout Mesopotamia. The following table indicates the extent to which they affected the British and Indian troops :—

Admissions to Hospitals on account of Effects of Heat.

British Troops.

	1917.			1918.		
	Cases.	Deaths.		Cases.	Deaths.	
		No.	Case mortality		No.	Case mortality
			Per cent.			Per cent.
January and February	—	—	—	—	—	—
March	61	—	—	2	—	—
April	612	1	—	10	—	—
May	390	—	—	68	1	1·4
June	307	7	2·2	121	—	—
July	2,949	425	14·4	189	10	5·2
August	1,086	63	5·8	147	17	11·5
September	810	27	3·3	24	3	12·5
October	18	1	5·5	12	—	—
November	9	—	—	1	—	—
December	—	—	—	—	—	—
Total	6,242	524	8·4	574	31	5·4

Indian Troops.

	1917.			1918.		
	Cases.	Deaths.		Cases.	Deaths.	
		No.	Case mortality		No.	Case mortality
			Per cent.			Per cent.
January, February and March	—	—	—	—	—	—
April	15	—	—	5	—	—
May	6	1	23·3	11	4	36·3
June	22	2	9·1	38	1	2·6
July	565	59	1·4	64	4	6·2
August	179	12	6·7	49	4	8·1
September	109	15	13·7	4	1	25·0
October	—	—	—	1	—	—
November & December	—	—	—	—	—	—
Total	896	89	10·0	172	14	8·1

Heat stroke stations were authorized on the scale of ten to a division and a varying number for each hospital centre, base or post on the lines of communication according to their size. These stations were usually constructed of reed matting with the sides open to allow a free current of air, the roof being double and in some cases treble, with a considerable overhang to provide shade. They were placed at suitable positions in corps, divisional and other areas and were provided with canvas baths and other equipment. Ice was supplied daily on a scale of 40 lb. per station. They proved of great value during the period of intense heat in the summer months. Other measures were also adopted with a view to preventing heat stroke. The troops were relieved of duty as far as possible between 10 a.m. and 4 p.m. They were given an abundant supply of drinking water and each man had a one-gallon canvas water bottle (chagul) in which the water was cooled by evaporation. Special instructions were issued in army orders on individual measures for mitigating the effects of heat and warning men of the risks of alcohol and other predisposing conditions. Billets and huts for troops were supplied as far as possible with electric fans, and tents were protected with matting. Hospitals were equipped with an ample supply of electric fans and ice, and arrangements were made for special wards for the treatment of heat stroke. Patients suffering from other diseases with a tendency to hyperpyrexia were covered with damp sheets and placed in the coolest parts of

the ward under a fan. Leave to India and the United Kingdom was opened in the summer, leave to India being given freely. Every division and formation arranged amusements for the men.

A light meal was prepared in the middle of the day, and dinner was given at an hour in the cool of the evening when the men were most likely to enjoy it in comfort. This system was doubly useful as the cooks had not to work during the heat of the day. Fatigues and parades were carefully regulated. but in certain places, especially on the Samarra line, defensive work involving hard physical labour had to be undertaken. Regulations regarding dress were relaxed.

Heat stroke station, Mesopotamia.

Lines of Communication, 1917.

Owing to the success of the advance and the wide distribution of troops beyond Baghdad, the arrangements on the lines of communication were reorganized. On 15th March 1917 the office of the A.D.M.S. Advanced Base Shaikh Saad, moved to Advanced Base, Baghdad, and on this date the administration of Shaikh Saad was handed over to a medical officer, designated the S.M.O. Shaikh Saad Section. The distribution then of medical units in Mesopotamia was as shown in the following table.

Medical Situation, 9th April 1917.

Corps, Bases, etc.	Medical Units attached.
Ist Corps :—	
3rd Division	Nos. 111, 112, 113 and 114 Combined Field Ambulances and No. 11 Sanitary Section.
7th Division	Nos. 127, 128, 129 and 130 Combined Field Ambulances and No. 12 Sanitary Section.
IIIrd Corps :—	
13th Division	Nos. 39, 40 and 41 Field Ambulances, and No. 28 Sanitary Section.
14th Division	Nos. 20, 21, 22 and 135 Combined Field Ambulances and No. 13 Sanitary Section.
Cavalry Division ..	Nos. 119 and 131 Cavalry Field Ambulances and No. 30 Sanitary Section.
Army Troops :—	
15th Division (en route)	Nos. 19, 23, 105, 108 Combined Field Ambulances and No. 16 Sanitary Section, No. 23 M.A.C. (portion) and No. 33 (Ford) M.A.C.
Sindiya	No. 19 C.C.S.
Baghdad Advanced Base..	Nos. 15, 16 and 20 C.C.Ss.; Nos. 5 and 6 Advanced Depôts of Medical Stores and Convalescent Depôt (half from Shaikh Saad) en route.
Baghdad	No. 23 British Stationary Hospital, No. 70 Indian Stationary Hospital, No. 46 Sanitary Section and No. 101 Sanitary Section.
Aziziya	No. 7 Field Ambulance (mobile column).
Baghaila	No. 6 Field Ambulance (mobile column).
Shaikh Saad	No. 8 Field Ambulance (mobile column), No. 31 British Stationary Hospital, No. 61 Indian Stationary Hospital, No. 14 Sanitary Section and half Convalescent Depôt.
Amara	Nos. 1, 2 and 32 British General Hospitals; Nos. 12, 21, 23 and 42 Indian General Hospitals; Officers' Hospital; Amara Isolation Hospital; Nos. 17, 31 and 100 Sanitary Sections; No. 3 Advanced Depôt Medical Stores; Officers' Convalescent Depôt; British and Indian Convalescent Depôts and No. 9 Field Ambulance (mobile column).
Qurna	No. 57 Combined Stationary Hospital.
Basra	Nos. 3, 133, 33 and 40 British General Hospitals; Nos. 8, 9, 10, 20, 22, 24, 25 and 27 Indian General Hospitals; Basra Isolation Hospital; Bait Naama Officers' Hospital; Nos. 10, 27, 29, 46 and 99 Sanitary Sections; Base Depôt Medical Stores; detachment of No. 23 M.A.C.
Mohammera	British Convalescent Depôt; Indian Convalescent Depôt.
Karun Defences :—	
Ahwaz	No. 5 Field Ambulance; No. 50 C.C.S.
Euphrates Defences :—	
Nasiriya	No. 24 Combined Field Ambulance; No. 27 C.C.S.; No. 83 Combined Stationary Hospital; No. 8 Advanced Depôt Medical Stores; No. 31 Sanitary Section.

On 30th June 1917 the Shaikh Saad section was merged into and renamed the Kut section, the administrative headquarters moving from Shaikh Saad to Kut. The area comprising the Shaikh Saad section had been constantly changing. On 15th March 1917 it covered the area from Ali Gharbi, inclusive, to Arab Village, inclusive, on the Tigris, and from Shaikh Saad to Atab, on the Hai river. On 19th March Shumran was added to it and on 19th May the area extended from Shaikh Saad to Azıziya inclusive, Ali Gharbi being then handed over to the Amara administration.

Shaikh Saad from being the advanced base and one of the most important points of the lines of communication was gradually reduced to a small defence post. The material of the light railway from Shaikh Saad to Atab was removed and all the posts along the railway line closed. Arab Village, at which there were large supply dumps and a population of 3,000, was closed on 23rd June and the post hospital there was withdrawn to Shaikh Saad.

The site of Kut port, some two miles below the town itself, was selected on 3rd April 1917 as a shipping centre and a rail base, and soon after this labour and reconstruction parties commenced work there. The numbers gradually increased until in July there were 8,000 men at work. The sites chosen for the hospitals were on the left bank of the river and a special railway siding was laid to the hospital area so that the transport of sick and wounded from rail and steamer was a simple matter. During April and the early part of May 1917 large numbers of men and material belonging to corps and divisions that had been left behind during the advance to Baghdad were collected at Shumran for transport up river. The camp there was occupied with numbers varying from 5,000 to 7,000 and the medical and sanitary arrangements had to be improvised from personnel and equipment of medical units in the area. By the 8th June the camp was evacuated. Similar arrangements had to be made at Baghaila and other small posts.

The units that had been opened at Shaikh Saad were gradually moved upstream to Baghdad. No. 31 British and No. 61 Indian Stationary Hospitals left detachments with 50 beds and 150 beds respectively at Shaikh Saad. These detachments were combined and formed into a temporary small hospital for British and Indian sick. On the arrival of a section of No. 24 Indian General Hospital at Shaikh Saad these detachments were released and rejoined their units at

Baghdad, sufficient British personnel being, however, retained from the detachment of No. 31 British Stationary Hospital to deal with the British sick. The section of No. 24 Indian General Hospital was accommodated in huts. A combined field ambulance composed of sections of differents units formed a modified field ambulance known as No. 30 Combined Field Ambulance. This was attached to the defence troops at Baghaila. A post hospital of 100 beds—75 for Indian and 25 for British—was improvised at Kut port until the headquarters and remaining sections of No. 24 Indian General Hospital arrived. The sanitary arrangements of the area were supervised by No. 101 British Sanitary Section.

The only diseases of any consequence occurring in the Kut section during the summer were sandfly fever and scurvy. Malaria had been very prevalent but infectious diseases, such as cholera, plague, cerebro-spinal fever, smallpox, diphtheria and typhus, were practically unknown. Only two cases of cholera were reported between the middle of March and the end of June, 1917. Sandfly fever came into prominence about the middle of May and continued during May and June, decreasing towards the end of the latter month. The cause of scurvy was, as usual, the insufficiency of a proper vegetable and fruit ration. The main difficulty was not the absence of a sufficient supply of fresh vegetables and fruit, but rather the lack of adequate and suitable arrangements for transporting these articles. The main supply of vegetables and fruit came from Amara and Ali Gharbi. From the latter place they were usually dispatched in mahelas, which were sometimes towed and sometimes came up under their own sail. As this often resulted in the consignments arriving late and in a damaged condition, efforts were made to send such supplies straight through to Kut and Shumran, but the chances of their arriving there in an eatable condition were always poor. This procedure was finally abandoned as it was found to be merely waste of time and of food to dispatch vegetables and fruit which invariably arrived in a state of decomposition. With the reopening of communication with the Hai mouth the problem of supplying sufficient vegetables at Kut was made easier and during the month of June a fairly steady supply of vegetables was obtained from the neighbourhood of Hai town. A local garden which had been established at Shaikh Saad also proved useful, as, by the end of June, 1,000 lb. of vegetables and fruit were being purchased daily. The Indian followers were those chiefly affected by

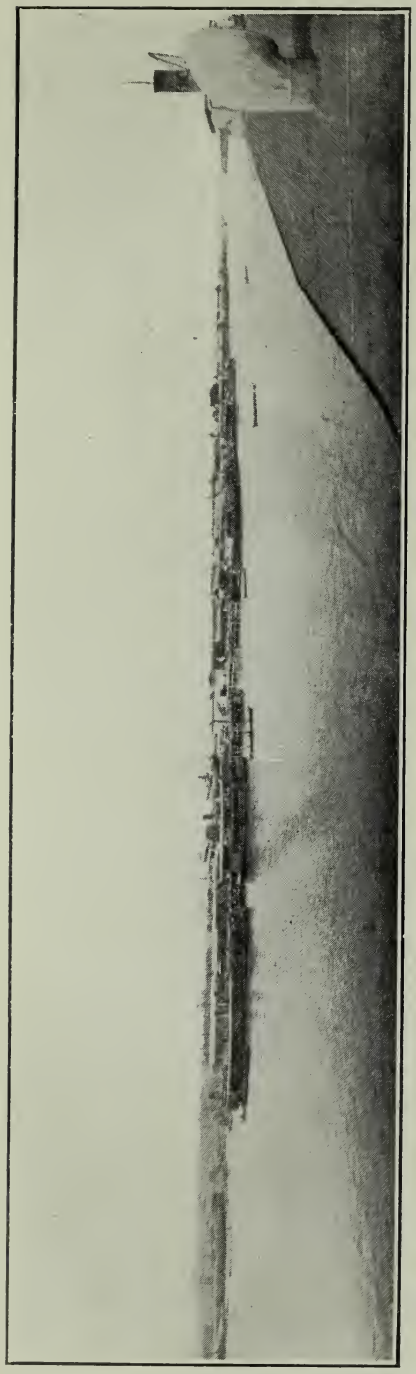
scurvy, especially those belonging to the labour and porter corps. These men were often poorly nourished and of comparatively feeble constitution, and were always required to perform wearisome and hard work. They were newly raised units under officers who had no previous experience of supervising the general health and food of large bodies of men and the same care and supervision of rationing did not exist as in the the Indian regiments.

The sanitation at Kut was specially well organized. The first work taken in hand there was the completion of the sanitary arrangements, so that when units arrived in their camping area they found everything in the nature of sanitary requirements ready, and nothing of a temporary nature had to be constructed by the troops.

The Kut section was extended on 12th July to Bawi, south of the Diyala river. The only communication between Kut and Baghdad up till July 1917 was by river, and in view of the difficulty of navigation during the summer months it had been decided to increase the transport facilities by constructing a railway line, which was opened for traffic on 22nd July. In addition, marching posts twelve miles apart, were established throughout the section. The post hospital at Kut was replaced by No. 24 Indian General Hospital and No. 133 British General Hospital. A separate tented hospital for infectious diseases was pitched and was staffed by personnel drawn from both these units.

A rearrangement of boats for the evacuation of casualties from Baghdad to Basra, under the River Sick Convoy Unit, became necessary. The section of the river between Baghdad and Kut from June to January was extremely difficult to navigate owing to its shallowness, and during that period the sick were transferred to Kut either by light draught boat or by railway. At Kut they were placed on fast river steamers which had been brought from the Brahmaputra River in India. These steamers were too large to navigate the narrows between Amara and Basra, and were consequently confined to the Kut–Amara run, the patients on board being transferred to the hospitals at Amara.

At Basra, after the reorganization in 1916, the medical services obtained adequate and ever increasing resources, and made steady, continuous progress. The increase in the force at the base necessitated additional medical arrangements. In December 1916 the strength of the base was :— British, 12,837 ; Indian combatants, 9,404, and followers,



View of Basra in 1918.

40,958; a total of 63,249; by the beginning of June 1917 the numbers had increased to :— 19,664 British; 12,147 Indian combatants, and 63,743 followers—a total of 95,554. This great increase was mostly due to the large influx of labour and technical personnel for the numerous works which were in progress, and in particular for the inland water transport, the railways, port work, supply work, hut building, road making and general improvements which were being undertaken in and around Basra.

The base area was also extended owing to the formation of a port at Nahr Umar, with railway works, supply depôts and camps, and also on account of the changes in the Euphrates defences, brought about by the transfer of the 15th Division to Baghdad. This increase in the size of the base area, and the growing numbers of the military population, rendered the collection and distribution of local sick a matter of considerable difficulty, especially when these were in outlying areas

such as Fao and Nahr Umar. To meet this difficulty a system of dispensaries and post hospitals was established, and gradually the number of these was increased to thirty-four. Each dispensary or post hospital was under the charge of a medical officer or assistant surgeon, with a staff of British and Indian other ranks. Beds were provided and patients could be retained for observation and treatment for forty-eight hours. In this way the hospitals were relieved, and the work of the motor ambulance convoy in the transport of sick was lessened.

Basra was by no means a healthy place, and the figures given below will enable a comparison to be made between the admissions to hospital in Basra itself and from up-river during the period December 1916 to September 1917.

Local Admissions to Hospital at Basra.

Month.	British.	Indians.	Followers.	P.O.W.	Total.
1916.					
December	1,594	1,682	3,700	—	6,976
1917.					
January	954	986	3,307	4	5,251
February	779	776	3,013	2	4,570
March	1,059	1,108	3,476	218	5,861
April	1,777	1,195	3,913	208	7,093
May	2,441	992	3,761	68	7,262
June	4,070	1,104	5,772	108	11,054
July	4,764	1,214	5,860	54	11,892
August	5,079	2,031	5,165	10	12,285
September	6,951	2,932	6,573	4	16,460
Totals	29,468	14,020	44,540	676	88,704

Transfers to Hospitals at Basra from Up-River.

Month.	British	Indians (including followers).	P.O.W.	Total.
1916.				
December	2,046	3,681	—	5,727
1917.				
January	1,742	3,443	40	5,225
February	1,964	3,854	334	6,152
March	1,368	2,686	1,180	5,234
April	1,668	2,536	279	4,483
May	1,522	2,109	248	3,879
June	1,036	1,620	58	2,714
July	1,701	833	16	2,550
August	2,101	1,329	1	3,431
September	1,321	738	2	2,061
Totals	16,469	22,829	2,158	41,456

An account of occurrences of cholera, plague, smallpox, schistosomiasis and other diseases in Mesopotamia have been dealt with elsewhere.* During the period of the above statistics, typhus was practically confined to Turkish prisoners of war, amongst whom there were 59 cases with 12 deaths. There were only two cases amongst British and the same number amongst Indians. Relapsing fever appeared amongst the Indian personnel, and there were 835 cases with 5 deaths, a case mortality of ·59 per cent. During the same period only 8 cases with 2 deaths occurred amongst British personnel. The number of cases of hyperpyrexia in the base alone amongst British was 1,803, with 207 deaths, and amongst Indians

Motor ambulance convoy camp, Basra.

247, with 52 deaths. The majority of these cases occurred between 5th and 19th July, when the temperature in Basra varied from 121·6° to 122° F.

One of the principal diseases affecting the troops was sandfly fever, and during July, August and September 1917, 6,667 British and 3,385 Indians suffering from this disease were admitted to hospital from the base area.

As the base developed and became a large port for sea-going vessels, the work of the port health medical officer increased. From December 1916 to September 1917, he inspected 853 ocean-going vessels, and from these 7 cases of plague, 12 cases

* Diseases of the War, Vol. I, Chap. IV, and Hygiene of the War, Vol. II, Chaps. XIV, XVI and XVII.

of smallpox, 2 of typhus, 2 of diphtheria and 10 of cerebro-spinal fever were removed. In addition to these inspections, the vessels were disinfected, but it was not always possible to

No. 3 British General Hospital, with the 1916 type of hut, Basra.

No. 3 British General Hospital, with the 1917 type of hut, Basra.

carry out the measures laid down in the International Quarantine Regulations on account of the possible delay to shipping.

The work of No. 23 M.A.C., which had arrived on 31st May 1916 and had been detailed for duty to Basra, and of the River Sick Convoy Unit was not easy. The duties of the former entailed the carrying of 80,577 patients over approximately 197,144 miles during the period December 1916 to September

1917. The headquarters of the River Sick Convoy Unit was moved to Amara in September 1917 owing to the alteration of the mode of evacuation from Baghdad. During May and June the new river hospital fleet, designed and built in England, had begun to arrive in Basra.

Work designed to improve hospital accommodation was steadily carried out. It involved improvements to existing sites and buildings, providing hutted accommodation where this was considered necessary, rebuilding hospitals where old huts had become unsatisfactory and building store-rooms, operating rooms, laboratories, cook houses, dining rooms and quarters for the personnel. This could only be done as labour and material became available, and the medical requirements had to be considered in relation to the needs of other departments. The aim was to make the hospitals equal to the standard prevailing in France and England. They were gradually fitted with every device that tended to moderate the acute discomforts caused by the climatic conditions. The earlier history of the Infectious Diseases Hospital at Basra has already been described. A site was obtained on an island in the Shatt-al-Arab, opposite the lower part of Basra. At first patients were accommodated in tents and were conveyed to the hospital in native bellums, but gradually tents were replaced by huts, an administrative block was opened, different blocks were set apart for the different infectious cases, and a well equipped laboratory was established. Electric lighting was installed and a plentiful supply of electric fans provided. A pier was run out to the river and the surrounding mud removed by dredger to facilitate the transfer of patients.

The convalescent depôts for British in Mesopotamia were developed on the same lines as in France and England. A new departure was made, however, when an Indian convalescent depôt was opened close to the British depôt. At first patients were accommodated in tents, but these were replaced by huts, and ultimately the Indian Convalescent Depôt consisted of ten huts, each containing fifty beds for convalescents, a hospital equipped for sixty beds, a dispensary, two open dining sheds, quarters for convalescent Indian officers and mess and quarters for British medical officers. A company system was adopted, and the patients were divided into five companies according to caste, for both fighting men and followers. The companies were in charge of havildars, usually chosen from convalescents. Convalescents, on arrival at the depôt, were allotted to companies, examined and classified.

Convalescents of the follower class were employed in road work and other labour; Indian fighting troops were given drill, route marches and physical exercises. The convalescents did all the cooking necessary for the depôt, and were also employed in gardening. Indoor and outdoor games were provided, and a suitable canteen was maintained. The average stay in the depôt of Indian fighting ranks was 32·62 days, and of followers 26·94 days.

The numbers of sick and wounded evacuated to India during the period were as follows :—

Month.	Nursing Sisters.	British.		Indian.		P.O.W.	Total.
		Offs.	Other ranks.	Offs.	Other ranks & Followers.		
1916.							
December ..	6	101	1,527	4,046*		—	5,680
1917.							
January	5	101	1,296	56	4,096	—	5,554
February	4	90	1,140	81	4,436	20	5,771
March	6	108	1,102	68	4,330	1,059	6,673
April	—	92	817	74	3,330	184	4,497
May	9	138	1,224	54	3,124	194	4,743
June	5	108	958	35	2,076	105	3,287
July	29	119	2,973	22	1,518	31	4,692
August	21	140	3,678	40	1,892	19	5,790
September ..	12	119	1,437	33	1,276	7	2,884
Totals ..	97	1,116	16,152	463	26,078	1,619	49,571
				30,587			

* Includes Indian officers, other ranks and followers.

Lines of Communication 1918.

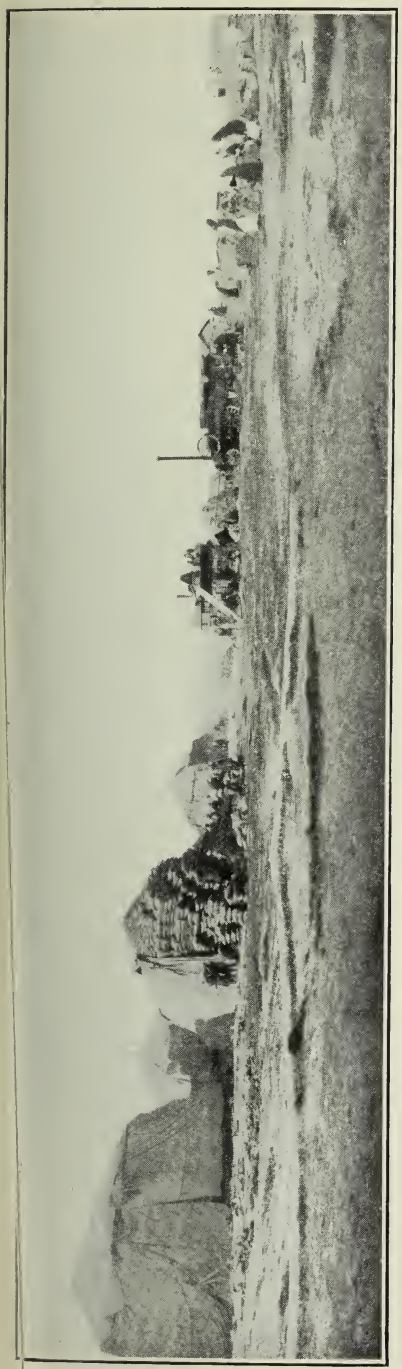
During 1918 the principal hospital areas on the lines of communication were Baghdad, Kut, Amara and Basra. Special dental, ophthalmological and other departments, such as bathing establishments, were instituted and excellently organized. All the hospitals were made as perfect as possible, and were supplied with every mechanical appliance and device that could assist in adding to the comfort of the sick and wounded.

The medical units at Baghdad were : No. 65 British General Hospital, Nos. 23 and 31 British Stationary Hospitals, Nos. 23 and 39 Indian General Hospitals, Nos. 61 and 70 Indian Stationary Hospitals, Isolation Hospital, Officers' Hospital, Nos. 16, 27 and 30 C.C.Ss., Nos. 3, 31, 40 and 110 Combined Field Ambulances and No. 152 Combined Cavalry Field Ambulance, and the Combined British and Indian Convalescent Depôt. At Amara there were Nos. 1, 2 and 32 British General Hospitals, Nos. 12, 21, 23 and 42 Indian General Hospitals, Isolation Hospital and Combined Convalescent Depôt ; and at Basra, Nos. 3, 33 and 40 British General Hospitals, Nos. 8, 9, 20, 22, 25, 27, and 39 Indian General Hospitals, No. 57 Combined Stationary Hospital, Base Isolation Hospital, Officers' Hospital and British and Indian Convalescent Depôts.

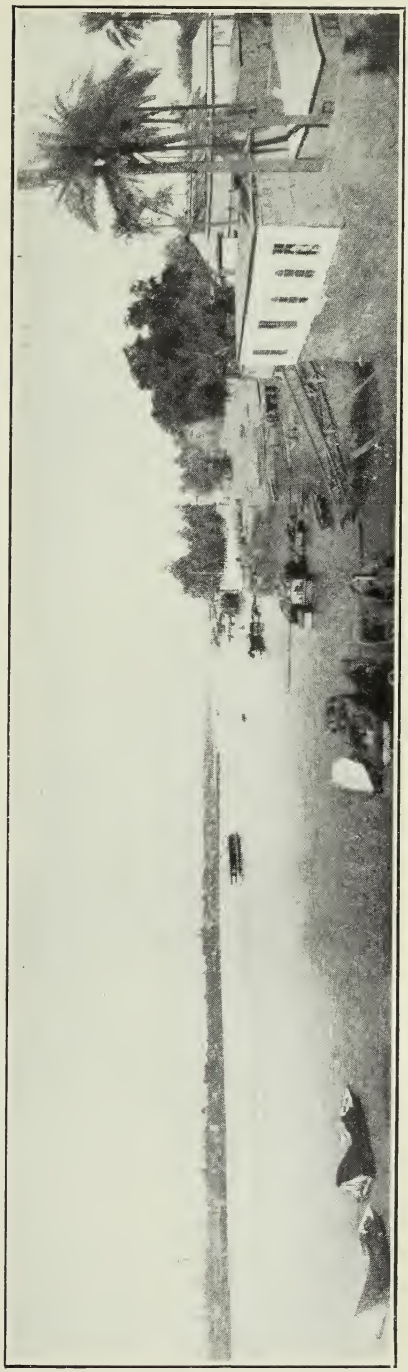
Indian Convalescent Depôt, Mohammera.

The development of water supplies and sanitary arrangements have been dealt with in other volumes. The rationing, supplemented by the produce of the dairy farms, poultry farms, and vegetable gardens that were organized, was ample for all requirements. Sick and wounded were evacuated downstream in the greatest comfort. As various types of hospital craft from England came into commission, considerable criticism was directed locally upon them, as many of the river steamers sent out were built and equipped, not according to the specifications given by General Treherne, who was conversant with local conditions, but according to ideas based on imagination rather than knowledge. The details have been dealt with in the chapter on the transport of wounded.

The most striking features at Basra were the development of the ration strength to a monthly average of over 112,000, and the number of local sick admitted to the hospitals in that area.



Local produce depôts near Baghdad.



River Tigris at Baghdad.

The admissions for sickness are shown in the following table :—

Monthly Numbers of Local Admissions to the Hospitals at Basra.

Month.	British.	Indians	Followers.	P.O.W.	Nursing Sisters.	Total.
1917.						
October	2,438	1,647	4,655	21	—	8,761
November ..	1,878	1,412	4,397	57	—	7,744
December ..	1,644	1,802	4,304	28	—	7,778
1918.						
January ..	978	1,139	3,236	25	—	5,378
February ..	895	1,139	3,444	7	—	5,485
March	1,127	1,099	4,336	16	—	6,578
April	1,230	1,424	5,071	391	—	8,116
May	3,057	1,319	7,631	263	—	12,270
June	2,767	2,009	6,371	344	—	11,491
July	2,976	1,901	10,328	401	25	15,631
August	1,753	957	5,730	463	10	8,913
September ..	1,774	744	4,983	146	24	7,671
October	4,237	1,223	7,305	390	36	13,191
November ..	2,407	928	5,060	335	15	8,745
December ..	1,138	589	2,955	243	8	4,933
Total ..	30,299	19,332	79,806	3,130	118	132,685

The number of cases evacuated to Basra from up-river hospitals and from Basra to India between May and December 1918, are shown in the following table :—

Transfers to hospital at Basra from Up-River, and monthly numbers of sick evacuated to India.

Month.	Transfers.				Evacuated.			
	Brit.	Ind.	P.O.W	Total.	Brit.	Ind.	P.O.W	Total.
1918								
May ..	595	1,333	641	2,569	667	1,829	74	2,570
June ..	1,059	1,430	203	2,692	1,131	1,996	33	3,160
July ..	445	1,247	41	1,733	780	2,281	241	3,302
August ..	532	1,117	35	1,684	697	1,666	85	2,448
September	267	616	9	892	270	1,216	111	1,597
October ..	1,286	2,324	—	3,610	597	1,801	52	2,450
November ..	1,393	2,398	725	4,516	1,072	1,717	—	2,789
December	1,629	1,674	691	3,994	815	2,837	1	3,653
Total	7,206	12,139	2,345	21,690	6,029	15,343	597	21,969

CHAPTER XIV.

THE MEDICAL SERVICES DURING OPERATIONS IN UPPER MESOPOTAMIA IN 1917 AND 1918.

AT the beginning of October 1917 it was decided to clear the Turks from the area around the Diyala River and occupy the Jabal Hamrin astride that river in order that the British might have control of the canals. These operations were entrusted to the IIIrd Corps, and the preliminary operation of driving the Turks out of their forward positions on the right bank of the Diyala where they were holding a line near Dali Abbas was undertaken by the 13th Division. This division was also to keep the Turks engaged while the main attack was developed from the south-east against the enemy's left flank.

On 9th October 1917 No. 39 Field Ambulance was ordered to move forward with the 40th Infantry Brigade, while No. 40 Field Ambulance was to send a section to Abu Khamsa and the remaining sections were to occupy their advanced dressing station at Tuwair. No. 41 Field Ambulance and No. 28 Sanitary Section were detailed to accompany the 38th Infantry Brigade. On 13th October the 40th Infantry Brigade moved up to Tijdari and its accompanying field ambulance was established at Bint-al-Hassan. On 16th October the 38th Infantry Brigade, with its field ambulance and No. 28 Sanitary Section, moved out from Sindiya and on the following morning marched on Bint-al-Hassan. On the same day No. 39 Field Ambulance proceeded to Qalat-al-Mufti. The 40th Infantry Brigade, with practically no opposition, occupied Dali Abbas at 4 a.m. on 18th October, being joined there by the remainder of the 13th Division later in the day. (See Maps pp. 364 and 370.)

The few casualties that occurred were sent to No. 40 Field Ambulance at Tuwair, the slight cases in the vans of the motor supply column and the more serious cases by ten motor ambulance cars attached from No. 40 M.A.C. The field ambulance evacuated the cases across the Tigris to railhead at Sadiya.

The 38th Infantry Brigade advanced on Mansuriya and the hills to the north-east of that village early on the morning of the 19th October. The village was situated at the foot of the hills in an elbow of the Diyala river. The Turks offered a feeble resistance and were easily driven out of their position. During this action an advanced dressing station was opened by No. 41 Field Ambulance in the vicinity of the junction

of the Khalis and Diyala rivers. The casualties were only two British other ranks killed and twenty-three wounded. They were evacuated to No. 40 Field Ambulance at Tuwair.

The 30th Brigade on 23rd October established a defensive line from Long Ridge Hill due east to the right bank of the Diyala river. This completed the initial operations against the enemy. The medical units of the 13th Division were then situated as follows : No. 40 Field Ambulance at Tuwair, with detachments at Khannahrwan and at Imam Abu Khamsah ; No. 39 Field Ambulance at Bint-al-Hassan, with a detachment at Qalat-al-Mufti ; and No. 41 Field Ambulance on the south bank of the Khalis at Dali Abbas, with a detachment at the north end of Mansuriya. No. 28 Sanitary Section was stationed near No. 41 Field Ambulance.

While these operations were in progress the enemy undertook a counter-demonstration on the Tigris and in the middle of October they sent advanced troops to Al Huweslat, eight miles north of Samarra, where they proceeded to entrench themselves. The Ist Corps was ordered to attack this force and on 24th October the 7th Division captured Al Huweslat and then proceeded to Daur supported by cavalry. This position was captured on 2nd November by the 28th Infantry Brigade, while the British cavalry endeavoured to press round the western flank. The advance was checked by heavy enemy artillery fire, under cover of which the Turks withdrew to Tekrit. The British advance continued and on 5th November Tekrit was attacked and the enemy then retreated beyond Tekrit. The troops of the Ist Corps were then ordered back to Samarra. (See Map p. 326.)

For these operations No. 127 Combined Field Ambulance, less two tent sub-divisions, accompanied the 21st Infantry Brigade, operating on the left bank of the Tigris. On the right bank of the Tigris, advanced dressing station parties were allotted from Nos. 119 and 131 Cavalry Field Ambulances to the Cavalry Division ; a bearer division and advanced dressing station party of No. 128 Combined Field Ambulance to the 19th Infantry Brigade ; No. 129 Combined Field Ambulance to the 28th Infantry Brigade ; No. 110 Combined Field Ambulance to the 8th Infantry Brigade ; and a bearer division of No. 112 Combined Field Ambulance to the 9th Infantry Brigade. Owing to the difficulty of supplying with rations the large force engaged, all animal-drawn transport had to be reduced to a minimum. The D.D.M.S. of the corps had therefore to arrange that field ambulances marched out

on a very modified scale of tentage and equipment, and with the exception of the advanced dressing station parties with the Cavalry Division no horsed ambulance wagons accompanied the medical units.

No. 40 M.A.C. was placed at the disposal of the Ist Corps for the operations and five motor ambulance cars of this unit were allotted to the force on the left bank, while the remainder were employed in evacuating casualties on the right bank. During the attack on the Daur position No. 40 M.A.C. transferred the casualties from the tent divisions of the field ambulances to No. 19 C.C.S. at Samarra.

Ford ambulance touring cars used in operations in Upper Mesopotamia.

For the attack on Tekrit three tent sub-divisions of No. 112 Combined Field Ambulance and the tent division of No. 128 Combined Field Ambulance were stationed near the supply dump at Daur position and acted as an improvised casualty clearing station. No. 40 M.A.C. was divided into two parts, one part engaged in clearing casualties from the tent divisions of the field ambulances in action to the improvised casualty clearing station at Daur, and the other portion in clearing the casualties from this casualty clearing station to No. 19 C.C.S. at Samarra. All returning empty Ford supply vans that were available with the force were used to evacuate the sitting and

walking cases, while after the battle the motor ambulance cars belonging to the combined field ambulances assisted the motor ambulance convoys in clearing the stretcher cases. From Samarra the casualties were evacuated by train to within three miles of Baghdad from whence they were distributed by river hospital steamers to the hospitals in Baghdad.

The total casualties were 2,500, of whom 1,800 were wounded and the remainder sick.

As an example of how cases can be evacuated from a field of battle situated thirty miles from the nearest casualty clearing station, this action stands out pre-eminently, but when

View of surrounding country on the Persian Lines of Communication.

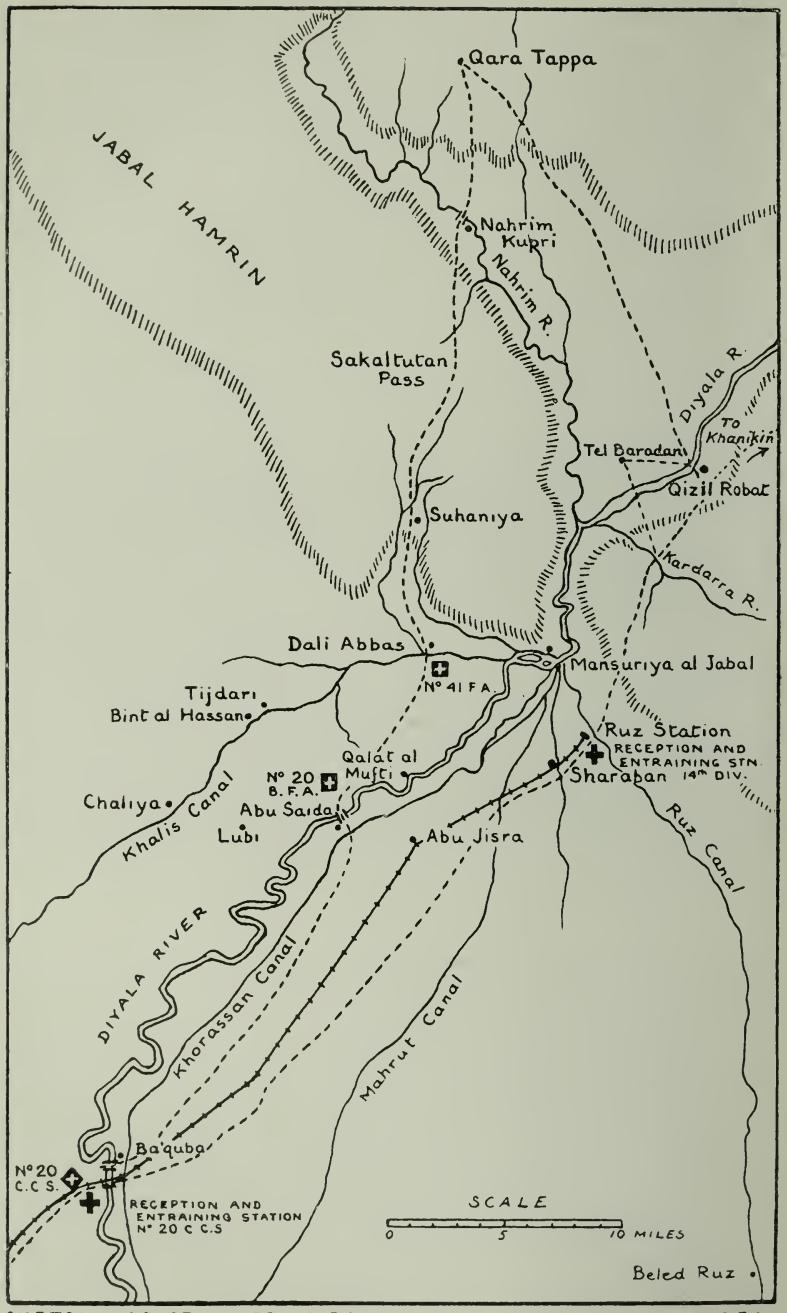
1,800 wounded have been cleared from the battlefield in the way described it is obvious that, with the medical units at the disposal of the force, the treatment carried out could not reach the standard of treatment with the British Expeditionary Force in France. In the reports relating to these operations there is no record of the use of any units such as the surgical teams employed in France, the surgical groups in Macedonia, or the mobile surgical units employed in Palestine, where the difficulties in transporting wounded were equally great and where it was found that such units, if carefully organized and well trained, could be attached to field ambulances and ensure for the wounded efficient treatment.

On 19th November 1917 Lieut.-General Sir Stanley Maude, the Commander-in-Chief of the Mesopotamia Expeditionary Force, died of cholera in Baghdad, and Lieut.-General Sir W. R. Marshall took over the command, while Lieut.-General Sir R. H. Egerton was appointed to the command of the IIIrd Corps in his place.

After the second action of the Jabal Hamrin the main canals, as well as their numerous tributaries, were rapidly bridged. In all, seventy-five bridges of various sizes were built and the Jabal Hamrin was converted from a roadless tangle of hills into an area provided with a number of roads suitable for wheeled

View of country on the Persian Lines of Communication.

traffic. The country was different from that through which the Tigris and Euphrates flowed. The troops were no longer operating in a desert, but amongst hills. On the right bank of the Diyala, beyond the Jabal Hamrin Range, the country opens out into valleys or plateaux. These are all very fertile, but there were large areas that had not recently been cultivated. On the left bank of the Diyala the country is much more hilly, becoming mountainous after crossing the Pai Tak Pass, where Persia is entered four miles north of Khanikin. After crossing the pass the road to Kermanshah runs east by south along a valley, the altitude of which is about 4,500 ft., and which during the winter is deep in snow and difficult for transport.



SKETCH MAP OF UPPER MESOPOTAMIA, JABAL HAMRIN AREA

The roads beyond the Jabal Hamrin ran over a pebbly and sandy soil, intersected by many watercourses which after rain tended to overflow on to the roads, making the passage somewhat difficult. During the dry season these roads were fairly good, and with a certain amount of repair and maintenance they were excellent for motor vehicles. Here, owing to the nature of the soil, the effect of rain on the roads was transitory, unlike the plains where, after heavy rains, the heavy alluvial soil became a quagmire of mud and was unsuitable for motor traffic. Up to a height of about 2,000 ft. there was little difference between the day temperatures experienced here and in the plains, but the nights were cooler.

Towards the end of November it was decided that the IIIrd Corps should attack that part of the 13th Turkish Army Corps which was holding the Diyala river above Mansuriya and the passes over the Jabal Hamrin and Qara Tappa. This task entailed the forcing of the passage of the Diyala and Nahrim rivers, and also of the Sakaltutan and other passes through the Jabal Hamrin.

The enemy forces were disposed in the Qara Tappa–Suhaniya–Qizil Robat area, and the IIIrd Corps, in co-operation with the Cavalry Division, was ordered to operate actively against them with the intention of surprising and destroying them by a converging attack in the direction of Qara Tappa. The troops of the IIIrd Corps were divided into three groups for the operations, right, centre and left.

The evacuation of sick and wounded required to be carried out along two separate and distinct lines, one from the right group and the other from the centre and left groups. The point to which it was arranged that all casualties should be transported was Ba'quba, where No. 20 C.C.S. was already established.

It had been intended to place No. 20 C.C.S at the railhead of the metre gauge railway on the left bank of the Diyala as the best position for the operations, but delay in the completion of the line across the river necessitated the unit remaining on the right bank.

Evacuation of wounded from the firing line to the field ambulances was effected by the field ambulance transport. From the field ambulances to Ba'quba a variety of transport was available. With the right group, cars of the motor ambulance convoy, Ford supply vans, and ambulance trollies on the railway for serious cases, and empty trucks for slight cases, were used. The cars of the motor ambulance convoy and the

Ford vans collected the cases from field ambulances and transported them to railhead at Ruz station, where they were admitted to a medical unit formed by the 14th Division for reception and entraining purposes, and then sent on to Ba'quba by rail.

With the centre and left groups, cars of the motor ambulance convoy and Ford supply vans were used. The Ford supply vans, however, did not run farther back than Qalat-al-Mufti, and it was therefore necessary to establish a medical unit there to receive cases en route to Ba'quba from the left and centre groups. This was arranged by detailing two sections of No. 20 British Field Ambulance from the IIIrd Corps Convalescent Camp to open as an extemporized casualty clearing station at Qalat-al-Mufti, with accommodation for about 400.

Two motor ambulance convoys, Nos. 39 and 40, were employed. No. 39 was detailed to carry out all evacuation from Qalat-al-Mufti to Ba'quba, assisted, if necessary, by No. 40, less two sections. The latter convoy was ordered to detach a section for duty with each division of the corps, the 13th and 14th, to work directly under the A.D.M.S., one section in front of railhead and the other in front of Qalat-al-Mufti.

The Red Cross Commissioner at Baghdad supplied the stores for the formation of buffets at change and entraining stations at Ruz and Qalat-al-Mufti and at No. 20 C.C.S. A Red Cross representative supervised each of these, thus relieving field ambulances of the necessity of diverting responsible medical personnel from duties in the unit for this purpose.

The sections of No. 20 British Field Ambulance at Qalat-al-Mufti were reinforced by some R.A.M.C. personnel from the motor ambulance convoys to assist as nursing orderlies and in the cookhouse, and extra tents and cooking utensils were obtained on loan from local units of the 13th Division to allow of the expansion of the sections for the accommodation of about 400 cases.

The consulting surgeon, Lieut.-Colonel Legg, was posted to No. 20 C.C.S., where he could deal with serious cases from either front.

The field ambulances taking part in operations in the forward area and their distribution on the morning of 3rd December 1917, when the attack was launched, were as follows :—

13th Division : No. 39 Field Ambulance, south of Suhaniya, with an advanced dressing station party accompanying the 40th Brigade ; No. 41 Field Ambulance at Dali Abbas, with advanced dressing station on its way to open south of Suhaniya when the situation permitted.

14*th Division:* No. 20 Combined Field Ambulance at Kardarra Crossing, with advanced dressing station accompanying the 37th Brigade at Qizil Robat ; No. 22 Combined Field Ambulance at Kardarra Crossing, with advanced dressing station for the 35th Brigade. The advanced dressing station parties marched with pack transport only.

The crossing of the Diyala was carried out by the troops of the 14th Division with practically no opposition, as was also the occupation of Suhaniya by the 40th Brigade.

The 35th Brigade forded the river near Qizil Robat, and some delay occurred in the construction of the pontoon bridge. This, and the difficulty of negotiating the boulder-strewn river-bed beyond the actual bridge, caused some delay in evacuation, but eventually cars were got across and brought cases from the forward area to the right bank bridgehead, where two sections of No. 20 Combined Field Ambulance were opened during the course of the day. Casualties were then carried across the river by bearers to No. 20 Combined Field Ambulance, and from there they were evacuated by motor ambulance convoy. The 37th Brigade crossed lower down after traversing a region devoid of roads, and it was impossible to get motor ambulance cars to their position near Tel Baradan. Mule-drawn ambulance wagons forded the river and evacuated the sick to sections of No. 22 Combined Field Ambulance at Kardarra Crossing. Fortunately there were no wounded in this area.

The 40th Brigade (left group) was held up on the 3rd December in an attempt to force the Sakaltutan Pass, and the attack was not pressed home. About forty casualties were sustained by the brigade on this date.

By the evening of 3rd December the field ambulances in the forward area, conforming to the movement of the troops, had reached the following positions :—

13*th Division :* No. 39 Field Ambulance in bivouac just south of Suhaniya, ready to move with the left group, with an advanced dressing station party of No. 41 Field Ambulance. No. 41 Field Ambulance open permanently at Dali Abbas. This unit, on 3rd December, received all cases from the left group. A buffet was instituted in order that cases sent back to Qalat-al-Mufti from No. 39 Field Ambulance could be fed on the journey when that unit moved forward.

14*th Division :* No. 20 Combined Field Ambulance open at Qizil Robat, astride the Diyala river. No. 22 Combined Field Ambulance, less two sections, at Kardarra Crossing ; two other

sections of No. 22 Combined Field Ambulance at Qizil Robat remained closed. Advanced dressing station of No. 20 Combined Field Ambulance with 35th Infantry Brigade.

At 4 a.m. on 4th December the left group forced the Sakaltutan Pass and advanced on Nahrim Kupri, which was occupied by the advanced troops of the brigade about 10.30 a.m.

The 35th Brigade, moving from the right bank of the Diyala about Qizil Robat to join up with the left group, was unfortunately held up, as the enemy, when retiring, had flooded the area. The brigade was able to join up with the left group in the evening to form a new force under Major-General Cayley.

The Sukaltutan Pass was reported to be narrow and difficult for transport, and the bridge over the Nahrim river had been destroyed by the enemy. The pass, however, was successfully negotiated by the transport of the field ambulances, but as a bridge was not made good over the Nahrim river until 5th December motor ambulance cars would have been unable to get beyond that point until then. The river was fordable for animal-drawn vehicles, but care had to be exercised on account of the quicksands at the ford.

Cayley's force attacked and captured Qara Tappa on the 5th December, the total casualties amounting to about 140, of whom about 25 were killed. The wounded were quickly collected. Those of the 35th Brigade were sent back by Qizil Robat and those of the 40th Brigade by Qalat-al-Mufti.

Cayley's force remained at Qara Tappa until the night of 6th/7th December. On its withdrawal, the 36th Brigade rejoined the 14th Division. The new positions then held by the IIIrd Corps included Sakaltutan Pass, Qizil Robat and Khanikin.

On the whole the evacuation of sick and wounded worked smoothly. If, however, the casualties had been heavy on the 5th December, some difficulty would have been experienced in evacuation owing to the broken nature of the ground, and delay would probably have occurred in clearing the field ambulances. The area in which the operations were conducted was probably the most difficult so far experienced by the medical services in the campaign in Mesopotamia, as the distance from the advanced dressing stations to the casualty clearing station at Ba'quba was from the left group about fifty-five miles by road.

A certain amount of delay in the running of the train service between Shahraban and Ba'quba was experienced, due to the heavy upward traffic and consequent congestion at the Diyala

bridge ; but since all patients were well provided with food for the journey, and as the supply of blankets was plentiful, no appreciable hardship was entailed. The buffets and stores provided by the Red Cross Society were of great benefit and much appreciated by the sick and wounded.

It was noticed with regard to motor ambulance convoy cars, more especially those of No. 40 M.A.C., that the authorized load of four sitting cases without kits was more than the springs of the Ford motor ambulance cars could stand, and orders were issued to the effect that not more than three cases were to be carried in future.

The total casualties during the operations were 30 killed and 182 wounded. The greatest number of casualties occurred in the 37th Dogras, who had 10 killed and 55 wounded, practically all during the attack on Qara Tappa on 5th December.

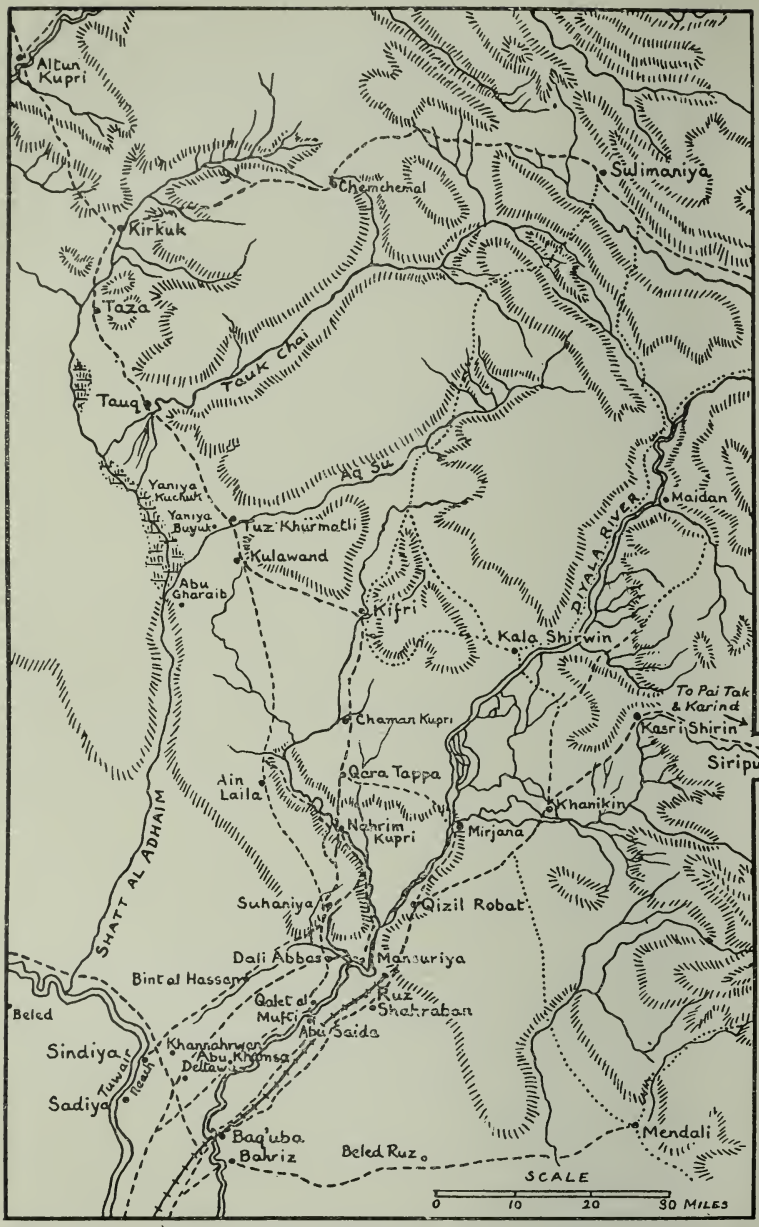
The sketch maps show the area of operations and the general lines of evacuation.

Operations north of Jabal Hamrin.

At the beginning of January 1918, a small column from the IIIrd Corps was sent as far as Pai Tak at the foot of the Tak-i-Ghirra Pass. It met with no opposition and on its return occupied Kasr-i-Shirin. With the object of opening up the main trade route via Kermanshah to Persia, the garrison at Kasr-i-Shirin was increased and small detachments were sent out in the direction of Kermanshah. Tribal labour was employed in improving the road which was greatly in need of repair.

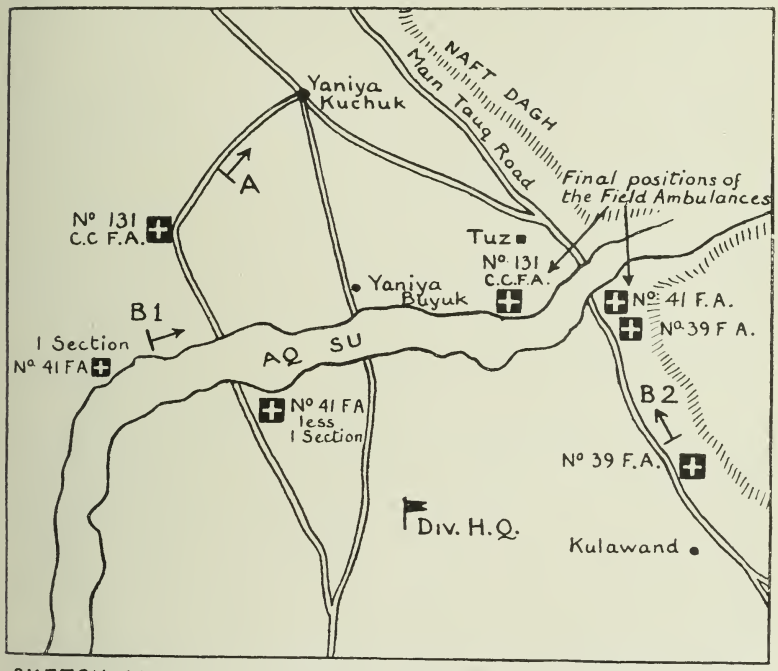
On the Persian border just north of the Kasr-i-Shirin–Kermanshah road certain tribes, notably some sections of the Sinjabis, became troublesome and a small column of all arms was sent to support the tribes friendly to the British. On 25th April a small action took place, and in order to make the Persian lines of communication more secure the army commander considered it advisable to drive the Turks out of the Qara Tappa–Kifri–Tuz Khurmatli area, and for the future to hold both Kifri and Tuz. These operations were again conducted by the IIIrd Corps.

On 24th April the various columns taking part in the operations concentrated along the Suhaniya Canal. These columns were known as Column A, composed of the 6th Cavalry Brigade, with artillery from the 13th Division and No. 131 Cavalry Combined Field Ambulance ; Column B (1), troops from the 13th Division, with one section of



SKETCH MAP OF THE AREA OF OPERATIONS NORTH OF THE JABAL HAMRIN

No. 41 Field Ambulance with reinforced transport, and Column B (2), troops from the 13th Division, with No. 39 Field Ambulance and No. 41 Field Ambulance less one section ; and two small columns C and D, the former consisting of half an infantry brigade with a squadron of cavalry and a few guns and the latter of a regiment of cavalry and a battery of horse artillery. Both were accompanied by detachments from a field ambulance. On the 25th April Columns A and B (1) moved to Ain Laila, and on 26th Column B (2), with divisional headquarters, moved to Nahrim Kupri. Subsequently



SKETCH MAP OF THE OPERATIONS AGAINST TUZ KHURMATLI

Column A marched to Tuz and Column B (1) to Abu Gharaib. While these columns were moving, word was received that Column B (2), moving up the River Adhaim, was already in Abu Gharaib, and that the Turks had left both Abu Gharaib and Qara Tappa. On 28th April Column B (2) was divided into two, and the 40th Infantry Brigade, under the command of Brigadier-General Lewin, marched into Kulawand. On the same day Column A, encountering the enemy forces retreating towards Tuz, charged them, killing 100 and capturing 538 prisoners. Column C at the same time occupied Kifri, taking 46 sick prisoners in the hospital.

The battle of Tuz Khurmatli was fought on 29th April 1918 by Columns A, B (1) and B (2), under the command of Major-General Cayley. While Column B (2) was attacking the enemy, Column A was working round towards Yaniya Kuchuk, and Column B (1) pressed on Yaniya Buyuk. By 9 o'clock the cavalry were astride the Tuz–Tauq road and gained a footing on the hills. At the same hour Column B (1) occupied Tuz and all organized resistance ceased. The majority of the casualties were admitted to No. 39 Field Ambulance and evacuated to Ain Laila ; the remainder, admitted to No. 41 Field Ambulance and No. 131 Cavalry Field Ambulance, were collected on the left bank of the Aq Su, opposite Tuz, and were also evacuated to Ain Laila.

The enemy retired on Kirkuk, 130 miles distant from the railhead. The British force was ordered to continue the pressure and to capture the town, but some readjustment of the troops was necessary in order to make the supply situation at all possible. Delay was also caused by torrential rains, and it was not until 7th May 1918 that the leading troops of the British force entered Kirkuk. The Turks offered little or no opposition, but they left behind them 600 sick and wounded soldiers who were in a deplorable sanitary condition and suffering greatly from malnutrition. The town itself was in a filthy state and the inhabitants at the point of starvation. The British troops, on taking possession of the town, were kept busy enforcing sanitary measures, salving or destroying military material, and evacuating prisoners and refugees. A small mobile force was left there after the main force had been withdrawn, but on 24th May 1918 this too was withdrawn. In the whole of these operations 3,000 Turks, 12 field guns and large quantities of ammunition were captured, with a total loss to the British force of 26 killed and 210 wounded.

Evacuation from the field ambulances to the lines of communication was satisfactory during both quiet and active periods. From the 13th Division area the routes were at first to railhead at Sadiya for the 39th Brigade, and to railhead at Abu Saida for the 38th and 40th Brigades. A reception and entraining station at Sadiya was formed by a lines of communication unit, and a similar station at Abu Saida by a detachment of a field ambulance of the 13th Division until 22nd February 1918, when this duty was taken over by a detachment of No. 16 C.C.S. The whole of this casualty clearing station was established at Abu Saida about the middle of April 1918 to deal with casualties of the 13th Division during the Kirkuk operations.

During the operations in October 1917 all casualties of the 13th Division were evacuated to Sadiya through Tuwair, this being considered more satisfactory than the route via Abu Saida to Ba'quba, where No. 20 C.C.S. was established in the Serai on the right bank of the Diyala. In December, however, No. 20 C.C.S. was moved to the Ba'quba road railway station, on the left bank of the Diyala, and as considerable improvement had taken place in the road, casualties from the 13th Division were cleared via Abu Saida to No. 20 C.C.S. at Ba'quba. A rest station with accommodation for 400 was established at Qalat-al-Mufti by sections of No. 20 British Field Ambulance and No. 1 Combined Field Ambulance, to which all cases from field ambulances in front were transferred, and from there the cars of No. 39 M.A.C. transported all to Ba'quba. During the later operations evacuation took place to No. 16 C.C.S. at Abu Saida, from which unit rail transport was available.

The rest station for the division was originally established at Ain Laila, but later, as the scope of the operations extended and in order to conform with a change in the divisional lines of communication, it was moved to Chaman Kupri, and eventually two further rest stations were required in front of this on account of the further advance made by the troops. One of these was located at Tuz and the other at Tauq, and cases were cleared by these stages.

As regards the 14th Division, all casualties up till the third week in October 1917 were cleared by motor ambulance convoys to No. 20 C.C.S. at Ba'quba, since up to this date the railway extension to Shahraban was not complete.

However, for the October operations the railway was available for sitting cases in open trucks, leaving only lying cases to be carried by motor ambulance convoy to Ba'quba. An extemporized casualty clearing station was formed by sections of No. 20 British Field Ambulance and No. 1 Combined Field Ambulance at Shahraban and an entraining station and buffet at a railway siding by a detachment of No. 21 Combined Field Ambulance. As heavy casualties were expected in the 14th Division, the consulting surgeon was posted to the extemporized casualty clearing station at Shahraban with a well-equipped operating room. There were, however, very few casualties.

Before the operations of December 1917 the railway extension had reached Ruz, and ambulance trollies were running on the line. These were of great assistance in evacuation. The entraining station at Ruz was organized by medical units of the 14th Division. Shortly after this date the entraining

duty at Ruz was taken over by a detachment of No. 20 C.C.S., to which cases of the 14th Division were evacuated during the later operations.

During the early months of 1918 the area of the 14th Division continued gradually to extend forward, till eventually Kermanshah was taken over. This extended line necessitated the evacuation of sick by stages, and sections of field ambulances were accordingly placed along the route. It was decided, however, that when Kermanshah was occupied it would be neither satisfactory nor desirable to evacuate sick from there because of the length of the journey, and also because it was considered bad policy to bring down sick during the hot weather from the hills to the plains; a medical unit equipped for prolonged treatment of cases of sickness was, therefore, asked for from general headquarters.

The medical units of the corps, in addition to their military duties, did a considerable amount of work amongst the civil population, and civil dispensaries were opened at Ba'quba, Shahraban, Khanikin, Kasr-i-Shirin and Kifri.

The chief diseases affecting the 13th and 14th Divisions from 1st October 1917 to 31st December 1918 are shown in the following table:—

Disease.	13th Division.		14th Division.	
	British.	Indian.	British.	Indian.
Enteric	8	1	2	7
Dysentery	627	46	234	295
Scurvy	1	4	—	7
Malaria	1,124	164	555	710
Jaundice	143	26	214	394
Diarrhœal group	1,087	159	698	565
Pneumonia	26	43	7	68
Diphtheria	10	1	8	—
Beri-beri	—	—	1	—
N.Y.D. Fever	3,313	498	1,189	1,519
Effects of heat	142	3	162	53
Mumps	—	—	—	8
Chickenpox	1	191	—	38
Colitis	3	4	98	92
Sandfly fever	743	27	632	403
Gonorrhœa	99	67	77	141
Venereal sores	92	39	78	104
Syphilis	13	8	7	24
Measles	—	—	3	—
Smallpox	60	6	30	7
Cerebro-spinal fever	1	5	—	9
Typhus	2	—	13	13
Relapsing fever	1	—	8	32
Soft chancre	—	1	—	5
Cholera	1	2	8	26
Influenza	550	248	401	883

The Final Operations on the Tigris, 1918.

During the winter of 1917–18 the composition of the Ist Indian Army Corps was gradually changed. The 7th (Meerut) Division proceeded to Palestine in December 1917 and was followed in March 1918 by the 3rd (Lahore) Division. The medical units which had been allotted to these divisions accompanied them. Two new Indian divisions, the 17th and 18th, replaced the 3rd and 7th Divisions. The medical units with the former were Nos. 3, 19, 35 and 36 Combined Field Ambulances and No. 1 Sanitary Section. Colonel J. H. R. Bond, R.A.M.C., was its A.D.M.S., and Captain P. S. Mills, I.M.S., its D.A.D.M.S. The medical units with the 18th Division were Nos. 37, 38, 39 and 40 Combined Field Ambulances and No. 22 Sanitary Section. Colonel J. H. Hamilton, I.M.S., and Captain H. C. Todd, R.A.M.C., were appointed A.D.M.S. and D.A.D.M.S. respectively.

From May to the end of September 1918 the 17th and 18th Divisions were in camps extending from Samarra to Tekrit, and were employed chiefly on the extension of the railway line to Tekrit. The hot weather of 1918 was normal, in contrast to that of 1917, and the heat was never excessive. The majority of the units comprising the new divisions were new to the country and had had little experience of actual warfare. The health of the troops remained good until the influenza epidemic occurred and affected a considerable portion of the force. Rations were sufficient and fresh vegetables and fruit were supplied. There was little evidence of dietetic disease. Leave, as far as ship accommodation permitted, was granted to all ranks during the summer.

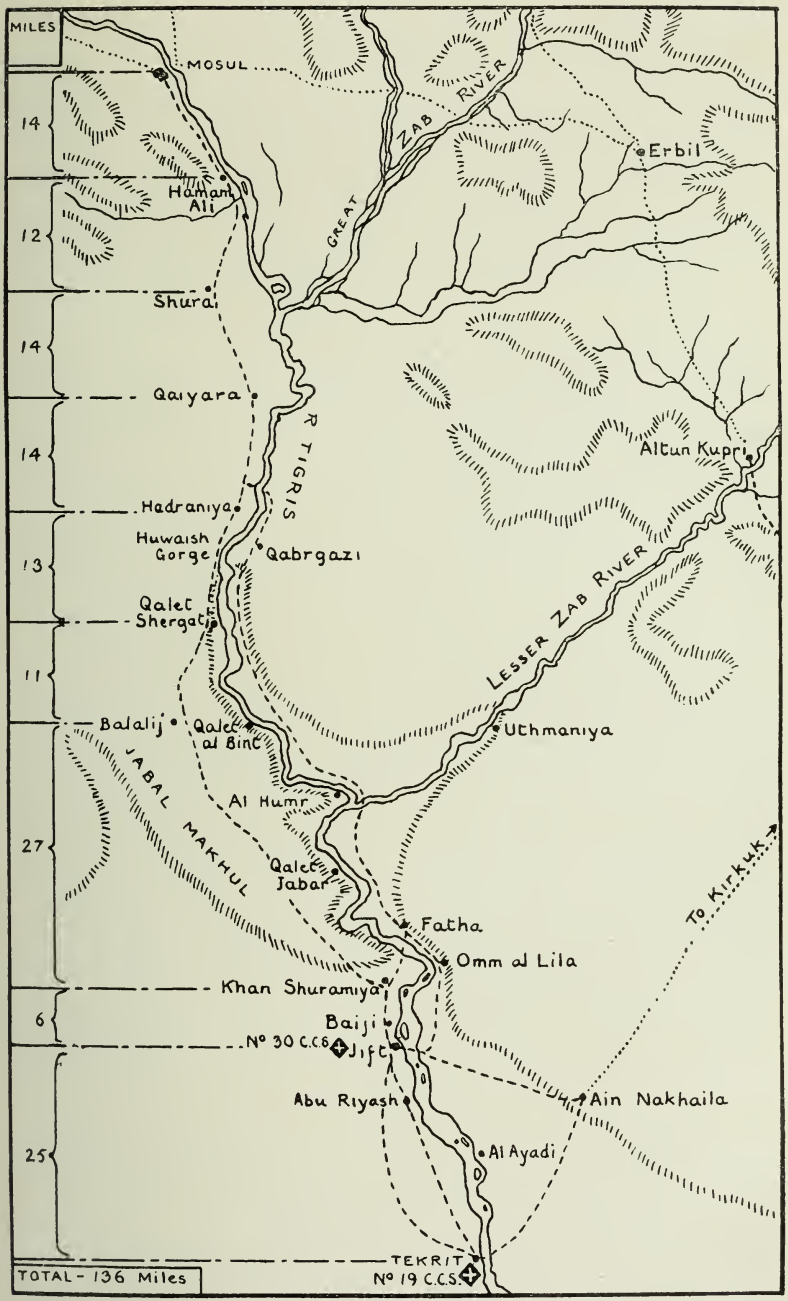
The Ist Corps headquarters, during the summer of 1918, remained stationed on the right bank of the Tigris at Baghdad, and a corps convalescent camp was opened during the summer months. Owing to the favourable weather and improved conditions, this camp was never so full as during the previous summer. It served a useful purpose, however, and was much appreciated by the troops.

The overwhelming victories achieved by General Allenby in Palestine and Syria had reacted to the British advantage in Mesopotamia, and had also improved the situation in north-west Persia. On 7th October 1918 the Commander-in-Chief of the Mesopotamia Expeditionary Force was ordered to take the offensive against the Turkish force, part of the 6th Turkish Army, which was covering the approach to Mosul. The bulk of this force was located on the Tigris, where it had held a

position astride the Fatha Gorge for eighteen months. The right flank extended to Shergat and was protected by two ranges of hills known as the Jabal Makhul and the Jabal Kanuka. On the left bank of the Tigris the position extended for about five miles along the crest of the Jabal Hamrin. Opposite the junction of the Lesser Zab with the Tigris the Turkish force had constructed a second position astride the Jabal Makhul and Jabal Kanuka, as well as trenches to defend the line of the Lesser Zab. A bridge at Al Humr gave them free movement between both banks of the Tigris.

The British force, in preparing an attack against such a position, was hampered by many difficulties. The railway had not reached beyond Tekrit. Many units in other formations were in outlying areas and required their transport, while the long line of communication to Persia absorbed a vast quantity of transport that would otherwise have been available for this operation. A good deal of preliminary movement was therefore necessary amongst the troops that were not to participate in the operations against Mosul, in order that they might be located near railways and thus be able to dispense with their second line transport, which would go to swell the supply columns of the troops on the Tigris. Similarly, all available motor ambulance transport was diverted to the Tigris, and the formations elsewhere had to evacuate their sick with a minimum number of motor ambulance cars. The operations against Mosul were carried out by the Ist Corps, augmented by the 7th and 11th Cavalry Brigades, while a force under Brigadier-General Lewin was detailed by the IIIrd Corps to operate on the right flank. The intention of the army commander was to turn the left flank of the enemy, clear this flank and cut the enemy's line of retreat to Mosul. By drawing on all possible sources for transport, both cavalry brigades and half the infantry brigades were made sufficiently mobile to carry out the intended operations.

On the 23rd October 1918 the Ist Corps was in touch with the enemy on both banks of the Tigris. The 7th Cavalry Brigade, by a circuitous march, moved north of the Jabal Hamrin, causing the Turks to evacuate their strong position at Fatha before daybreak the next day. On the same date the 11th Cavalry Brigade, which had concentrated at Ain Nakhaila on the previous day, after a forty-five mile march, reached the Lesser Zab, twenty miles above its confluence with the Tigris. The brigade crossed a deep ford in the neighbourhood of Uthmaniya and the 17th and 18th Divisions followed



SKETCH MAP OF THE ROUTE FROM TEKRIT TO MOSUL

up the retreating Turks, while the light armoured motor batteries proceeded to Al Hadr, sixty miles west of Shergat, and established a base in the desert. On the 25th October the 7th Cavalry Brigade and the leading brigade of the 18th Division forced a crossing over the Lesser Zab near its confluence with the Tigris. The 11th Cavalry Brigade sent a force down the right bank of the Zab, and General Lewin's force drove back a Turkish force and occupied Kirkuk. By these movements the Turkish troops on the left bank of the Tigris were forced to retreat across their bridge at Al Humr.

On the 26th the 17th Division continued its advance against the Al Humr position, and the 11th Cavalry Brigade crossed the Tigris opposite Hadraniya, some fourteen miles upstream from Shergat, and seized the Huwaish Gorge. The light armoured motor batteries moving from Al Hadr round the right rear of the enemy cut the telegraph line to Mosul, thus isolating the Tigris force from the 6th Turkish Army headquarters. The following day the 11th Cavalry Brigade and light armoured motor batteries launched an attack against the enemy's reserves, and the 53rd Infantry Brigade, marching from the Lesser Zab, reached Huwaish, a distance of thirty-three miles, on the afternoon of the 28th. Meanwhile, the 17th Division continued its advance and pressure on the Turks, and at 2 p.m. attacked their position three miles south of Shergat. The 7th Cavalry Brigade succeeded in joining the 11th Cavalry Brigade, after marching seventeen hours from Fatha and covering forty-three miles. The whole force at Huwaish then came under the command of General Cassels, the G.O.C. of the 11th Cavalry Brigade. The enemy was thus between two British forces, and during the night 28/29th October made repeated attempts to break through the mixed cavalry and infantry force at Huwaish. This mixed force had also to deal with another attack ; for the 5th Turkish Division, moving down from Mosul, attacked the right flank of Cassels' force. The 7th Cavalry Brigade, however, met and dispersed this Turkish division, capturing 1,000 prisoners, two guns and some machine guns.

The British advance was successful, and at dawn on 30th October the Turkish troops surrendered, and the 7th Cavalry Brigade and light armoured motor cars were immediately ordered to push rapidly along the Mosul road. A column consisting of the 7th and 11th Cavalry Brigades and the 54th Infantry Brigade under Major-General Fanshaw, marched on

Mosul and by 10th November this force was in full possession of the town. The Turkish troops had withdrawn to Nisibin on the Aleppo road.

The total captures during the operations amounted to 11,323 prisoners, 51 guns, 130 machine guns, 2,000 animals and three steamers. The total British casualties were about 1,600.

With regard to the medical arrangements for the cavalry operations, it was found that so long as cavalry was in a standing camp a combined cavalry field ambulance was of use in collecting and treating sick of the brigade. Whenever active operations commenced, however, only a small mobile advanced dressing station party could accompany each brigade. The greater part of the equipment and personnel had to remain behind at the brigade dump, as the army bearer corps personnel and the majority of the nursing personnel were not mounted, and unless conveyed in special wagons could not keep pace with the advancing cavalry. Occasionally an improvised tent division did follow on, but the usual rule for the cavalry advanced dressing station parties was to collect the sick and wounded and pass them on to the nearest infantry field ambulance.

With regard to the medical units accompanying the infantry, advanced dressing station parties and bearer personnel conformed to the movements of their formations. One tent division ultimately reached a situation near the Huwaish Gorge. This unit was established on the left bank and the wounded were ferried over in pontoons. These pontoons also served a useful purpose in transferring some Ford motor ambulance cars to the right bank, where they assisted in bringing back the wounded of the mixed column under General Cassels. Field ambulances were opened at Qabrgazi, at the Lesser Zab and at Fatha ; No. 30 C.C.S. was stationed at Jift and No. 19 C.C.S. at Tekrit. The distance from Qabrgazi to the Lesser Zab was twenty-six miles, from the Lesser Zab to Fatha eighteen miles, from Fatha to Jift sixteen miles, and from Jift to Tekrit twenty-five miles. The evacuation was carried out by stages, and casualties were conveyed by motor ambulance cars to within a mile of the Lesser Zab, where they had to be transferred to horse-drawn wagons owing to the roughness of the road. The cases were retained there overnight and sent on the following morning by motor ambulance car to Fatha, where they were again detained before being transferred to the casualty clearing station at Jift. It was not until 4th November 1918 that the evacuation was completed.

When Mosul was occupied No. 40 Combined Field Ambulance was moved into a building adjacent to the Turkish cavalry barracks.

The work on the railway from Tekrit was rapidly pushed on. Railhead was advanced to Baiji and the railway opened for traffic on the 9th December 1918.

By this time the force occupying Mosul and the vicinity consisted of a cavalry brigade and an infantry brigade, with a few attached troops. Posts were established on the road between Baiji and Mosul and small posts and garrisons were established along the Lesser Zab, at Altun-Kupri and at Erbil and Kirkuk. During wet and wintry weather the communication was bad and evacuation was delayed.

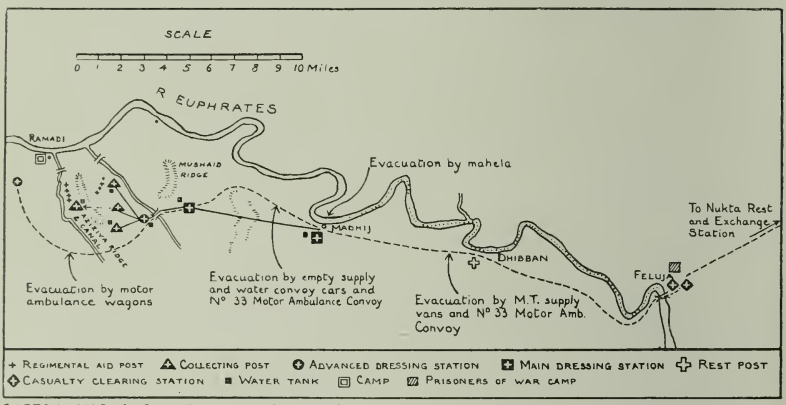
Gradually changes took place in the disposition of the divisions. The 17th Division was moved down to Tekrit and the 18th provided the garrisons for Mosul and all posts. The 11th Cavalry Brigade returned to Baghdad, while the 7th remained at Mosul. A portion of No. 30 C.C.S. was moved up to Mosul, and was established in the Turkish cavalry barracks. It was gradually provided with the equipment of a stationary hospital. No. 40 M.A.C. was employed in transporting this unit and in evacuating patients on the return journey, but owing to the bad state of the roads the convoy took five or six days for the return journey in fine weather, and on every journey the majority of the cars were damaged and had to go to the repair shop.

CHAPTER XV.

THE MEDICAL SERVICES DURING OPERATIONS ON THE EUPHRATES IN 1917 AND 1918.

WHEN the small column failed to take Ramadi in July 1917, preparations were at once begun for resuming the attack during the following September. The enemy held an advanced position four miles east of Ramadi on Mushaid Ridge which runs north and south and rises some 60 ft. above the plain. The task was allotted to the 15th Division. The division, strengthened by additional units and the 6th Cavalry Brigade, under the command of Major-General Sir H. T. Brooking, was known as "Brooking's Column" and was ordered, on 14th September, to move to Feluja, a three days' march, in four echelons. The first camp was fixed five miles from Baghdad, the second camp at Khan Nukta, and the third camp at Feluja. Each echelon was accompanied by a portion of a field ambulance and a detachment of No. 16 Sanitary Section. Before the echelons left Baghdad, Colonel G. B. Irvine, I.M.S., the A.D.M.S. of the division, had been invalided, and Lieut.-Colonel E. W. W. Cochrane, R.A.M.C., was appointed in his place. The D.M.S. of the force ordered two combined field ambulances of the 15th Division to be made up to war establishments. No. 33 M.A.C. was attached to the column. It was proposed to place twenty-five of its cars with the light repair workshop at Feluja and twenty-five cars at Baghdad, and, when heavy casualties were anticipated, to concentrate the whole convoy at Feluja, and use it for transferring the lying-down cases to Baghdad. A post was being arranged at Nukta, where supplies from Ford vans would be transferred into motor lorries, and arrangements were made to evacuate the lighter cases to Nukta by the supply lorries and transfer them thence to Baghdad in empty Ford supply cars. Consequently, a medical rest station and buffet were opened at Nukta. Arrangements were also made for an adequate provision of bleaching powder solution for sterilizing water, and for three tons of ice to be taken out daily from Baghdad by No. 33 M.A.C. and stored in an ice-pit at Feluja. The motor ambulance cars and the motor ambulance convoy could possibly be used beyond Feluja, and arrangements were also made for evacuating cases from Ramadi to Feluja by mahela.

The medical units at the disposal of the column were two combined field ambulances of the 15th Division, one from the Cavalry Division, and No. 111 Combined Field Ambulance from the 3rd Division. The last was already in Feluja, and had accommodation for 200 cases in buildings. It was proposed to send a consulting surgeon and a section of a casualty clearing station to Feluja if these were considered necessary, and to build up a reserve of stretchers there. No arrangements had been made for preparing the temporary camps which the echelons were to use on the march to Feluja; however, on the advice of the A.D.M.S. of the column, the 50th Brigade, which was stationed there, arranged a camp with a water supply and latrine accommodation, and asked the Y.M.C.A. to



SKETCH MAP SHOWING THE DISPOSITION OF MEDICAL UNITS AND THE ROUTES OF EVACUATION OF CASUALTIES DURING THE BATTLE OF RAMADI, SEPTEMBER 1917.

open a buffet in the camp. All available ambulance and transport wagons were sent out every morning to meet the incoming echelons, supply them with water, and bring in men who had fallen out on the march, as the troops had not fully recovered from the effects of the hot weather, and were not in a fit condition for heavy marching. The headquarters of the column was detained at Feluja for nine days; and this delay gave the A.D.M.S. time to organize Feluja as an advanced hospital base, to become acquainted with the country, to develop schemes of evacuation, and to obtain extra personnel, a supply of stores, medical equipment and comforts.

On 19th September the General Staff estimated that the number of casualties would be 4,000.* As noted above, the medical units for the collection and evacuation of this number of wounded were only three combined field ambulances, one

* This estimate included sick and wounded enemy casualties and British and Indian casualties from heat and exhaustion.

combined cavalry field ambulance and the motor ambulance convoy. The total distance wounded had to be transported was about sixty miles, and the roads from Madhij, a position a few miles from the enemy, to Feluja and from Feluja to Baghdad were so bad that, in the opinion of both military and medical staff, they were considered unsuitable for the evacuation of serious cases. Requisitions were made for extra equipment, personnel, and an additional field ambulance. A detachment of No. 15 C.C.S. arrived in Feluja on the 24th September, and was equipped to accommodate 200 serious cases. Two thousand extra blankets were issued, but these did not arrive at Feluja until the 28th September, the morning of the battle. The British Red Cross Society gave generously, and their gifts were used to equip the rest stations at Nukta and Dhibban and a mahela evacuation convoy. Before the force left Feluja No. 111 Combined Field Ambulance, acting as a C.C.S., had been expanded to accommodate 600 cases, and a suitable building and a site for the casualty clearing station had been prepared. A disinfecting section had been ordered out from Baghdad, a small advanced rest camp and a convalescent section had been organized, rest posts at Dhibban and Nukta had been equipped, and instructions had been issued regarding the evacuation of wounded from the front to Feluja and thence to Baghdad.

The force concentrated at Madhij at dusk on the evening of the 27th September 1917, and before daybreak on the 28th had secured important tactical positions, which compelled the enemy to withdraw from Mushaid Ridge. At 7 a.m. the cavalry moved from the right flank to the left, then crossed the Euphrates Valley Canal, and pushed westward across the Aziziya Canal to a position astride the Aleppo road so as to cut off the enemy's retreat. The infantry on the left advanced against the enemy's southern front, the right was withdrawn, and passing in rear of the left column launched an attack which secured a firm footing on Aziziya Ridge. By nightfall on the 28th the enemy was hemmed in on the south-east and south by the British infantry and on the west by the cavalry, whilst to the north ran the River Euphrates. At 3 a.m. on the morning of the 29th the enemy tried to break through the cavalry but were driven back. At 6.15 a.m. the infantry attack was renewed, and by 11 a.m. the whole of the Turkish force had surrendered.

The medical arrangements for this battle were as follows: Two tent sub-divisions of No. 23 Combined Field Ambulance

and two from No. 105 Combined Field Ambulance were formed into a main dressing station at Madhij ; the other tent subdivisions of these units remained packed up and were ready to move at a moment's notice to Ramadi, to open there for the reception of sick and wounded. An advanced dressing station was formed by the bearer divisions. All available divisional ambulance wagons, ambulance tongas, motor ambulance cars and touring cars, with ten motor ambulance cars from No. 33 M.A.C., were concentrated at the advanced dressing stations. There were thus 6 medical officers, 250 bearers with 150 stretchers, 13 horsed ambulance wagons, 12 ambulance tongas, 15 motor ambulance cars and 5 motor touring cars for front line work. The dressing station conformed to the movements of the infantry, and was opened about a mile from the two brigade headquarters. Motor ambulance cars, motor supply vans and ambulance wagons assisted the bearers in clearing the regimental aid posts. No. 131 Combined Cavalry Field Ambulance was detailed to send out an advanced dressing station party, ambulance wagons and motor ambulance cars with the Cavalry Brigade. The remainder of the unit was kept packed ready to move forward as required. Casualties from the cavalry advanced dressing station were evacuated by motor cars to the infantry advanced dressing station. The total casualties at the battle of Ramadi were 120 killed and 845 wounded. All the wounded were cleared from regimental aid posts by 2 p.m. in the afternoon of the 29th. About 150, however, were so slightly wounded that they remained with their units without evacuation to the field ambulances.

The cases were evacuated from the advanced dressing station to the main dressing station by the motor ambulance cars of No. 33 M.A.C., empty supply wagons, and the Ford vans carrying water supplies. The evacuation from the main dressing station at Madhij to Feluja was carried out in the following manner : Slight cases were sent back by the empty supply Ford vans ; the serious cases, such as injuries to head, lung, abdomen, and fractured femurs, were sent downstream in the empty supply mahelas which were temporarily equipped for the evacuation of casualties. All other cases were evacuated by No. 33 M.A.C. The maximum temperature during the operations was never over 102° F.

A special feature of the operations was the water supply column which was organized to supply troops in the firing line with water. This was the first time that such a scheme had

been attempted on a large scale. Large canvas tanks, holding 2,000 gallons of water, were erected just behind the firing line at positions indicated by the infantry brigade headquarters. Large tanks were also erected at Fort Madhij for the use of the main dressing station. Two men from No. 16 Sanitary Section were attached to the water column to chlorinate the water, which was pumped from the river into *pakhals*.* The *pakhals* were then placed in motor vans and transported to the brigade tanks situated behind the infantry lines. Fatigue parties from each regiment refilled the regimental *pakhals* from the brigade tanks. Twenty-six thousand gallons of water were distributed in this manner to the troops, and there is no doubt that this organization did much to assist the fighting troops in carrying through successfully the attack on Ramadi, as the plentiful supply of drinking water prevented many men falling out from exhaustion. The brigade water tanks became well known to the troops, and a small detachment of medical personnel was placed near each tank to act as a collecting post for sick and wounded, who with such a landmark to guide them were prevented from straying over the desert. The returning vans after delivering the water at these sites assisted in bringing back the slightly wounded to the advanced dressing station.

From Feluja the slightly wounded were evacuated by motor lorry to Nukta, where the refreshment staff stationed there attended to them. They were then transferred in empty supply Ford vans to hospitals in Baghdad. The serious cases were all detained in Feluja under the care of the consulting surgeon, Colonel Legg. Such cases were transferred to Baghdad by No. 33 M.A.C., when reported as fit to be removed. The enemy captured in Ramadi numbered 3,454, of whom 192 were wounded. The wounded were gathered together in Ramadi, and evacuated as soon as possible to Feluja, where they were detained in separate wards.

Major-General Brooking's column, after the capture of Ramadi, was concentrated on the old Turkish camping ground near that town. The troops arrived at dusk on the evening of the 29th and bivouacked in the midst of indescribable filth.

Owing to the insanitary condition of Ramadi and the camping grounds, and to the presence of a large body of prisoners, the A.D.M.S. of the division decided to evacuate all sick and wounded prisoners to Feluja, where special arrangements had been made for cleansing and treating them and for disinfecting their clothing. As the greatest danger to the troops would

* Metal water containers.

arise from the insanitary conditions prevailing, the efforts of the medical service were concentrated on sanitary work. This was no light task, as the force had moved out on a light scale of equipment, and there was no transport available for No. 16 Sanitary Section or for units to carry necessary materials. The difficulty of making early and satisfactory sanitary arrangements was increased by the constant movements of the troops and the breaking up of units into smaller formations, which moved into camp before the sanitary arrangements could be completed.

The D.M.S. of the expeditionary force before the operations commenced desired a speedy evacuation of casualties from the battle of Ramadi to the splendidly equipped hospitals in Baghdad, so that the sick and wounded might enjoy all the comforts that were provided. He had not, however, taken into account the fact that before the patients could reach Baghdad they had to be transported over sixty miles of very bad roads, which prevented the transport of serious cases. The column commander realized this, and insisted on having extra medical units suitably equipped sent out and stationed at Feluja, in order that serious cases might be properly treated before being sent on to Baghdad.

The A.D.M.S. of the 15th Division, in view of the fact that the conditions around Ramadi were typical of any that might occur when a force was operating at some distance from the advanced base and only connected by very bad roads with the advanced hospital base at Baghdad, suggested that on the commencement of an action a temporary mobile surgical unit, consisting of surgeons and attendants and the necessary equipment, should be sent from the hospitals at Baghdad to the first unit at which patients could be retained in the field. This was desirable, as an advance might cover many miles, and the personnel and equipment of a combined field ambulance were not sufficient to allow of operating on an extensive scale, and at the same time carry on the routine work of receiving and evacuating convoys and treating the less serious cases.

It had been demonstrated that the number of dysentery cases always increased after active operations, especially when the British troops camped near old Turkish sites. The tendency of formation commanders to encamp their troops in such places was a feature of the campaign in Mesopotamia, and as the men were often tired out when they arrived and sanitary measures took time to organize and construct, the disease infected personnel before preventive

measures were established. The formation of a sanitary company composed of four sections, to replace the sanitary sections with each division in the field, was consequently suggested, one section to accompany each of the three brigades and the remaining section the divisional troops. This company was to have had its own transport to carry all the materials necessary for an anti-fly campaign, and be provided with the necessary apparatus for simple bacteriological work and water examination, as well as to supervise the proper distribution of bleaching powder and vaccines packed in thermos flasks for preventive inoculation. A divisional sanitary company organized on these lines, however, did not materialize.

Further active operations on the Euphrates commenced in March 1918 and extended from the 16th of that month until 14th April. The period before the actual operations commenced was occupied in reorganizing the medical service, in organizing preventive measures against the numerous infectious diseases which were prevalent at the time, and in the routine duties connected with the occupation of a large area. Feluja, Madhij and Ramadi were all occupied. There were many minor posts in the desert, and a defensive position was prepared up-stream of Ramadi for any attack that might be made by the Turkish force on the Euphrates.

The evacuation of casualties was always difficult until a railway line was constructed to Feluja by the end of December. The road from Ramadi to Feluja was very bad in dry weather and impossible in wet. On one occasion a convoy of sick, in motor ambulance wagons, stuck fast in the mud and the patients had to remain out all night. The arrangements for the retention and treatment of cases of infectious disease were also unsatisfactory. The medical regulations authorized by the D.M.S. insisted that infectious cases should be retained and treated by the combined field ambulances in their respective areas. The divisional staff was constantly preparing schemes for a fresh advance, which the G.O.C. of the division anticipated would be rapid and extend, if necessary, over 100 miles. The G.O.C., consequently, viewed with considerable misgiving the fact that the mobility of all his field ambulances was hampered by the retention of infectious cases. In Ramadi there were 40 cases of smallpox, and in Feluja there were 40 cases of smallpox, 61 of chickenpox, 3 of scarlet fever and 17 of mumps. This fact was repeatedly pointed out to the D.M.S., with the request that a section of a hospital from

the lines of communication might be stationed in the area for the reception of these cases. Gradually the medical schemes for overcoming the difficulties connected with extended operations in this area were put into execution, and the units and material necessary for a fresh advance were provided.

For the renewed operations on the Euphrates a force consisting of the 12th, 42nd and 50th Infantry Brigades, the 11th Cavalry Brigade, with armoured motor cars and extra artillery and divisional troops was organized. Between October and December the troops were occupied in consolidating their forward positions and in establishing a sense of security amongst the surrounding tribes. During December and January the Turks again became active. Their main position was two miles above Hit, behind a depression known as the Broad Wadi, while the reserves were concentrated at Sahiliya, fifteen miles upstream. Orders were given to the divisional commander to drive the enemy as far as possible from Hit and to inflict all possible damage on him.

The medical arrangements were as follows : No. 111 Field Ambulance, which had acted as a casualty clearing station for the Ramadi operations, was ordered to rejoin the 3rd Division, and was relieved by No. 34 Combined Field Ambulance from India on 10th November 1917. No. 108 Combined Field Ambulance, during November, rejoined the 15th Division, and No. 1 Combined Field Ambulance arrived in the divisional area in the last week of December. The section of No. 15 C.C.S. was joined by the headquarters and other sections of the unit on 22nd October 1917, and the whole unit moved to Dhibban, which had become the railhead. Its duties in Feluja were taken over by No. 31 Combined Field Ambulance. No. 27 C.C.S. also arrived in the area and was posted to Ramadi in January 1918. In addition, five motor ambulance launches were sent by rail to Feluja. Two motor ambulance convoys, Nos. 33 and 40, were lent to the division for the operations. A reserve of stretchers, blankets, dressings and comforts necessary for extended operations was gradually built up.

On 8th March the Turks evacuated their advanced positions and concentrated at Khan Baghdadi. The British column occupied Hit on 9th March and Sahiliya on the following day. On the 25th the British force was concentrated at Sahiliya and divided into five columns.

On the 26th March the action of Khan Baghdadi began. The assault against the Turkish left was launched at

5.30 p.m. under heavy covering fire, and drove the enemy on to the cavalry whose foremost troops had reached the Aleppo road, ten miles in rear of the Turkish position, at 5 p.m., and so cut off his retreat. The assaulting troops continued their pressure against the Turks who eventually were completely repulsed, and 1,000 taken prisoners. By 5.30 the following morning the other infantry columns came up and completed the defeat of the enemy, capturing a large number of prisoners, supplies and munitions of all sorts. The cavalry and a mobile column in motor vans advanced and captured Haditha, and on the 28th Ana was taken. The Turkish commander, the commandant at Ana, 212 officers and 5,022 other ranks were captured, along with a great amount of military stores, at a loss to the force of only 157 killed and wounded. In order to carry out the wishes of the Commander-in-Chief to drive the attack home and to inflict as much damage materially and morally as possible, it was necessary to pursue the enemy as far as possible. To this end a valuable incentive was unexpectedly provided in the rescue of Lieut.-Colonel Tennant, Director of Aviation, and Major Hobart, who had had to make a forced landing behind the Turkish lines on the 25th.* The supply of petrol captured at Ana enabled this rescue to be effected seventy-three miles beyond Ana, but the long pursuit put an unexpected strain on the medical arrangements.

One type of native craft used at Ana.

The medical arrangements for the advance required careful consideration, in view of the great distance over which the sick and wounded had to be carried by road, but the arrangements made for the mobile column proved sufficient. To each column was allotted a portion of a field ambulance which had to carry a large stock of extra comforts, blankets and splints, so that any unit could remain behind to act as a temporary casualty clearing station while the others moved on. An extemporized

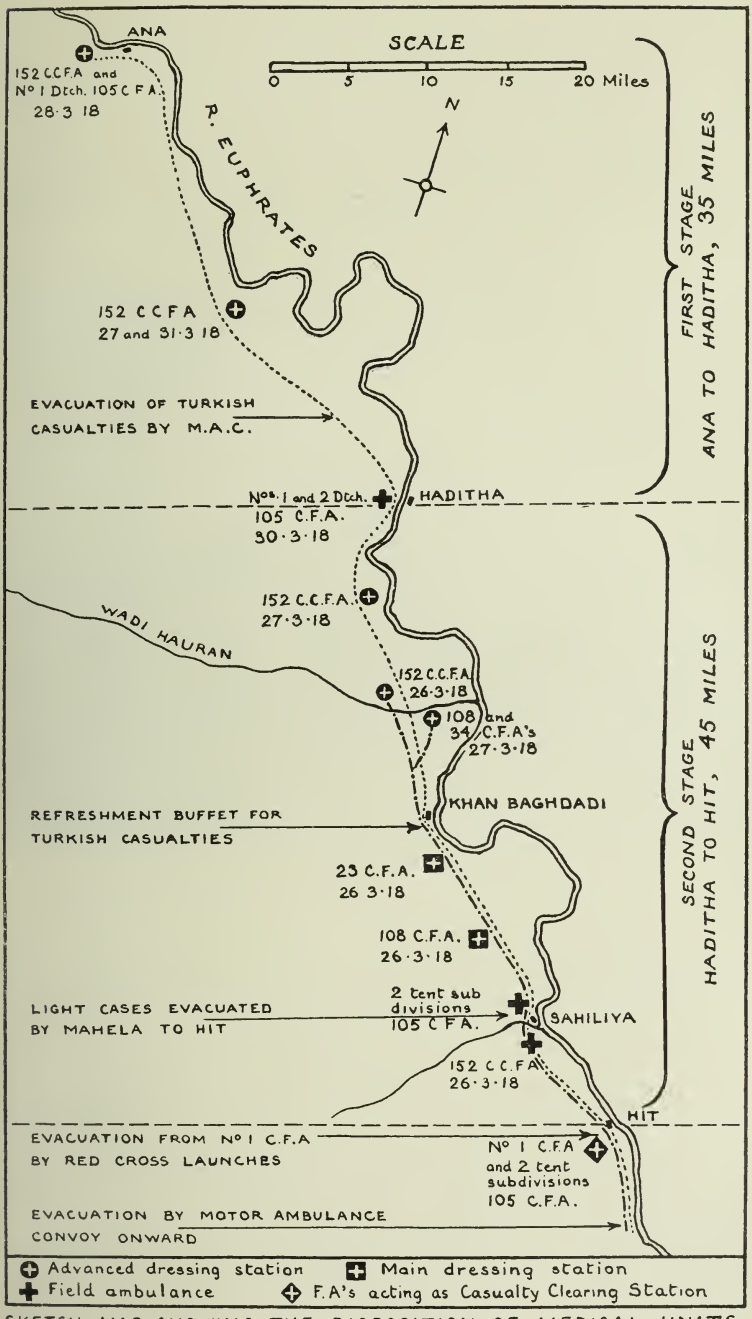
* See " An Involuntary Visit : Three Days with the Turks in Mesopotamia," by P. C. S. H. Blackwood's Magazine, July 1918.

casualty clearing station was formed at Hit by No. 1 Combined Field Ambulance, to which were allotted extra personnel, extra equipment, beds and special surgical appliances. No. 34 Combined Field Ambulance was detailed to open posts and supervise the arrangements on the lines of communication between Hit and Ramadi.

When the action commenced a main dressing station was opened at a central point, while a subsidiary dressing station for walking wounded was established at Sahiliya. At the main dressing station the divisional motor ambulance cars were concentrated into a divisional convoy. This divisional convoy

A convoy of Red Cross motor launches on the Upper Euphrates during the Khan Baghdadi operations.

was detailed to evacuate casualties from infantry columns to the main dressing station, while No. 33 M.A.C. evacuated casualties from the cavalry column. No. 40 M.A.C. was to carry the serious cases from the main dressing station to No. 1 Combined Field Ambulance at Hit, and in addition to have cars specially arranged to take abdominal cases direct to Hit, where the consulting surgeon, Colonel Legg, was posted. Walking wounded were to be sent to Sahiliya, where they could be transferred in mahelas to Hit. At Hit the motor ambulance launches were formed into a convoy to evacuate the cases downstream to Ramadi, until the motor ambulance convoys were free to assist. These arrangements for the advance and subsequent evacuation by motor ambulance convoy are shown on the sketch map.



SKETCH MAP SHOWING THE DISPOSITION OF MEDICAL UNITS AND ROUTE OF EVACUATION OF CASUALTIES DURING THE ACTION AT KHAN BAGHDADI & THE RAID ON HADITHA & ANA, 1918

After the British sick and wounded had been collected and the advanced troops had reached Ana, Nos. 33 and 40 M.A.Cs. were both occupied in clearing Turkish casualties from Ana and Haditha. The journey was long and tedious, and rest posts had to be established along the line of evacuation.

In connexion with the advance, water points on the lines adopted at the battle of Ramadi were formed, and hot tea was provided for all the troops before going into action.

Method of protecting the water supply of a unit from heat, Mesopotamia.

Gradually the additional troops lent to the 15th Division were withdrawn, and by the middle of April 1918 the distribution of troops was as follows : Hit area—50th Infantry Brigade with attached troops, No. 108 Combined Field Ambulance and a detachment of No. 16 Sanitary Section ; Ramadi area—42nd Infantry Brigade with attached troops, No. 34 Combined Field Ambulance, No. 23 Combined Field Ambulance, No. 40 M.A.C. and a detachment of No. 16 Sanitary Section ; and Madhij–Feluja area—12th Infantry Brigade with attached troops, 11th Cavalry Brigade with attached troops, No. 105 Combined Field Ambulance, No. 125 Combined Cavalry Field Ambulance and a detachment of No. 16 Sanitary Section.

No. 1 Combined Field Ambulance left Hit for Hilla on 13th April. No. 33 M.A.C. sent twenty-five cars to Hilla on 8th April, and the remainder of the unit left for Baghdad on 13th April.

The Turkish prisoners were at first collected at Khan Baghdadi. They were in a miserable condition, and many were suffering from intestinal disease. No. 23 Combined Field Ambulance detailed medical officers to examine all prisoners and supervise the sanitation of their camps. The prisoners were marched to Hit in columns 500 strong. When the first column reached Hit on 2nd April a case of typhus fever was reported, and evacuation of prisoners was temporarily stopped. Another field ambulance, No. 105, was given

The manufacture of sun-dried bricks used for building huts and hospitals, Mesopotamia.

medical and sanitary charge of the prisoners of war camp at Hit and ordered to open two sections for the reception of sick prisoners. All the available disinfecting equipment and personnel were concentrated at Hit, and the prisoners were bathed, disinfected and vaccinated. They were medically examined and classified daily into those (*a*) fit for all duties, (*b*) fit for light duties, or (*c*) unfit for duty. The different classes were segregated in separate tents. They received two meals per day, which were served at 7 a.m. and 4 p.m., and consisted of stewed rice, dhall, bully beef and vegetables cooked in Turkish field kitchens. An allowance of atta, ghi and firewood for chappaties was issued daily. Tea and sugar were issued when available, and the local Arabs were allowed to sell dates and cigarettes in a small bazaar opened in the camp. The chief

diseases amongst the prisoners were anæmia, debility, diarrhœa, emaciation, incipient tuberculosis and mild scurvy.

On 1st May 1918 the 15th Divisional area was considerably extended and an extra infantry brigade, the 56th, was allotted to the Hilla area. There was considerable movement during the summer owing to the difficulty experienced in supplying food, and as far as possible troops and medical units were concentrated round the railhead at Dhibban, while a railway had been constructed to Hilla from Baghdad. Much of the time of the medical services was occupied in combating the different infectious diseases, such as smallpox, influenza, cholera and other tropical diseases, which were prevalent at the time.

The troops were well housed in billets and European pattern tents. Working hours and duties were closely supervised, water supplies and sanitation improved, and amusements provided. During this period numerous labour corps were sent into the area to develop the country. They were employed mostly in schemes of irrigation and in laying the railway line from Basra to Baghdad. They were usually posted in out-of-the-way parts of the country and often no intimation was given of their expected arrival, so that it was sometimes difficult to supply medical units for their requirements.

The following table shows the principal diseases and the number of cases, British and Indian, admitted to hospital from the force operating on the Euphrates between 1st October 1917 and 31st December 1918.

Admissions to Hospital from the Euphrates Force for Sickness from October 1917 *to December* 1918.

Disease.	British.		Indian.	
	Admissions.	Deaths.	Admissions.	Deaths.
Dysentery	1,266	1	951	5
Influenza	541	—	843	—
Jaundice	437	—	339	—
Smallpox	133	21	70	4
Malaria	200	—	206	—
Diarrhœa	386	—	481	—
Diarrhœal Group	107	—	73	—
Colitis	67	—	165	—
Pneumonia	59	5	321	45
Cholera	7	3	18	7
Enteric Group	6	—	7	1
Effects of Heat	3	—	2	—
Scurvy	—	—	207	—
Chickenpox	—	—	117	—

A dental surgeon joined the division at Feluja on 27th October 1917. Between then and 31st December 1918 he attended over 6,000 cases. In addition he assisted in educating not only the British soldier but also the Indian rank and file in the use of the toothbrush and the hygiene of the mouth. In an area such as has been described he could have accomplished even more if a dental mechanic had been included on his staff. A large dental centre with every modern appliance had been opened at Baghdad to which men requiring dentures and dentures in need of repair had to be sent. The distances were great, the delay was inconvenient, and when men were called up for treatment it was found that many had been transferred to another area.

The medical history of the force operating on the Euphrates would not be complete without reference to several organizations that assisted the medical services in supplying patients with the comforts and food they required. A large poultry farm was organized in Hilla by general headquarters, and this farm supplied fresh eggs and poultry to the hospitals in Baghdad. Similar schemes were developed on a smaller scale at Ramadi, Hit and Madhij, fowls to stock the farms being obtained locally and from Hilla. These poultry farms were supervised by the medical units in the area. The Royal Engineers supplied material for henhouses and the division authorized the issue of damaged grain for food and detailed for the working of the poultry yards skilled poultry farmers from the territorial regiments in the formation, with the result that the egg output per month was about 4,500 and the medical units never lacked fresh eggs, chickens or pigeons for the use of patients in hospital. A military dairy farm was also inaugurated, which supplied fresh milk to medical units, regimental aid posts and regimental messes. Divisional, hospital and unit vegetable gardens were organized, the hospital garden at Ramadi, for example, yielding 200 lb. of fresh vegetables per week. Divisional fisheries were also formed at Feluja, Madhij and Ramadi. Trained Arab fishermen were employed, and sometimes one ton of fresh fish per day was issued to British troops instead of meat.

In the winters of 1916–17 and 1917–18 the 15th Division made strenuous efforts to provide hot baths for both British and Indian troops. During the winter 1918–19 elaborate schemes were initiated and each station had its own dressing room or tent and separate bathing arrangements for British and Indians,

with hot and cold water laid on to the rooms and tents, and disinfecting apparatus for lice-infested clothing, with the result that between twelve and fourteen thousand men received hot baths weekly.

During the summer of 1918 leave to England and India was given freely, and a divisional convalescent depôt was opened at Feluja for both officers and men. The depôt was well equipped by the division and by the British Red Cross Society. The units in the area looked on it with pride, as they had helped to make it. British officers and men were sent there direct from units without being obliged to report sick or to pass through a medical unit. Christmas week of 1918 witnessed a great divisional gathering at Ramadi. Camps were erected, the men from outlying stations were entertained, and all units took part in hockey, boxing and football tournaments, race meetings and, at night, social entertainments. There can be no doubt that the energy and sympathy of the divisional commander and his staff in organizing different industries and entertainments for the benefit of their men, both sick and well, was an outstanding feature of the history of the formations in this area of Mesopotamia.

Two Euphrates salmon, caught at Ramadi, weighing 118 lb. and 98 lb. respectively. The former was 5 ft. 6 in. long and the latter 5 ft. 4 in.

During the early months of 1919 demobilization was rapid, and in March the 15th Division was disbanded in accordance with the orders of general headquarters and their stations on the Euphrates were taken over by the 17th Division.

Lessons of the Operations in Upper Mesopotamia.

The operations in Upper Mesopotamia are chiefly of interest on account of the vast area involved. Casualties were never numerous, but, on the other hand, the medical service was called upon to deal with great numbers of debilitated and sick prisoners of war. They usually found these sick prisoners in a very insanitary condition, and this constituted a danger to the British troops.

Much valuable experience was gained. Without motor transport the evacuation of the sick and wounded would have been extremely difficult. Field ambulances had to form rest stations along the road. Little or nothing could be done, however, to carry out operative treatment on the seriously wounded.

The military operations were all wide sweeping movements, with the object of surrounding and capturing the Turkish forces. The operations were not simple, and during their course the corps or divisional commander might alter his strategic plans, and call his administrative medical officer to rearrange his scheme for the evacuation of casualties. This happened in the operations at Kirkuk.

Occasionally during the campaign administrative medical appointments to divisions were made at the last moment, just before the particular formation was going to undertake active operations. In the circumstances which existed in Mesopotamia, when officers both of the R.A.M.C. and the I.M.S. were serving, it would have been difficult to avoid an equal distribution or selection of officers from both services for these appointments. At the same time, this involved at times the selection of an officer who was untrained in staff duties or ignorant of the requirements of mobile warfare.

It was difficult to give the wounded a standard of treatment approximating to that in France or Belgium. Mobile surgical units such as existed in France, Macedonia and Palestine were not organized and used in Mesopotamia. In Baghdad there were sufficient perfectly equipped hospitals staffed with reliable surgeons and personnel only too anxious to proceed to the front. A scheme for forming mobile surgical units was prepared, and units could have been organized, but the requirements of the General Staff and the consultant surgeons were conflicting. The force had to be freed at once of all sick and wounded so as not to interfere with the mobility of the troops ; whereas the essential after-treatment of cases on which operations were performed involved the retention of the patient in a comfortable bed with careful nursing, if such injuries as

wounds of the head, chest, or abdomen were to benefit by operation. Consequently, the difficulty in Mesopotamia was to establish an advanced operating centre in a suitable forward area, and this could not be done. The only alternative was to evacuate the serious cases by aeroplane. For the later operations undertaken by the IIIrd Corps, the D.D.M.S., Colonel Sloan, had considered such a method. He had arranged with the Royal Air Force that as soon as aeroplanes were to be no longer required by the General Staff, the seriously wounded abdominal cases would receive a powerful injection of morphia hypodermically and, when under the influence of this narcotic, they would be strapped into the aeroplane and taken direct to Baghdad, which would be reached in about two hours' time. The drawback in this arrangement was the fact that the aeroplanes would only become available when they were no longer required by the General Staff.

During the military operations north of Baghdad, the D.M.S. of the force was able to divert ambulance transport from the formations not actually engaged to the formation conducting the operations. Fortunately, the number of British casualties was comparatively small and the transport provided was sufficient. If, however, the casualties had been larger, their evacuation would have overtaxed the available transport.

While the number of British casualties was small, the number of sick prisoners of war was large. These, too, had to be evacuated. They required special attention in order to prevent the spread of disease. Every unit in the Mesopotamia Expeditionary Force was at some time or other in contact with Turkish insanitary conditions. There were minor epidemics of typhus and relapsing fever, smallpox and cholera were prevalent, and the diarrhœal group of diseases due to bad water supply and the insanitary surroundings are prominent in such records of divisions as are available. In addition, there was the task of inspecting and cleansing prisoners of war. These are all tasks for an efficient sanitary service, and while the sanitary sections with the divisions, medical officers with units, and the units themselves did everything to limit the spread of disease, it is obvious that more attention should have been paid by the D.M.S. of the force to the building up of a more extensive, better and more modern sanitary organization for troops operating in such a theatre of war.* That this was

* In the spring of 1919, a Committee was formed by the D.M.S. of the Expeditionary Force to report on the War Establishments and the Mobilization Store Tables best suited for medical units serving in Mesopotamia. The findings of this Committee are given in Appendix A.

necessary is well illustrated by the report of one formation, in which it is stated that although about £60,000 were being expended on a Ransome water filter, which took months to erect and could only supply one part of the divisional area, the sanitary section which was responsible for purifying the water for the whole of the area had great difficulty in obtaining a Primus stove and burette valued at a few shillings.

After the armistice, and when demobilization was taking place, the Army of Occupation in Upper Mesopotamia consisted of the 17th and 18th Infantry Divisions with some cavalry and armoured cars. The 13th Division, less one brigade which had been sent to the North Persian Force, and the 14th Division were gradually demobilized.

CHAPTER XVI.

THE MEDICAL SERVICES DURING OPERATIONS IN NORTH-WEST PERSIA.

EARLY in 1918 a mission, known as the "Dunsterforce," under Major-General L. C. Dunsterville was sent from Mesopotamia to Persia. Additional troops were sent forward as far as Kasvin in May 1918. The British force in Mesopotamia was thus embarked on an operation of great difficulty. From railhead to the Caspian and Enzeli is nearly 700 miles by road, and the road west of Hamadan was non-metalled and traversed rocky passes, one at least of these being more than 7,000 ft. above sea level. The country in the immediate neighbourhood of the road was famine stricken, and not only was the food situation an anxious one but much transport was required for the supply of petrol, oil, spare parts, ordnance stores and the many and varied articles of equipment necessary for maintaining a force in the field.

The Dunsterville mission arrived at Kasvin on 1st June 1918, and on the 8th of that month, a Russian detachment which accompanied it marched from there with the intention of proceeding to Enzeli, and thence by ship to Baku. On 20th July the Jangalis, inhabiting the closely wooded country round Resht, attacked a small British detachment located at that town. A small British force landed in Baku on 4th August 1918, and further reinforcements were sent there during the remainder of the month. On 14th September there was an encounter with the Russian Red troops, and the British troops who had fought with great gallantry throughout the day, embarked at night on three ships and subsequently reached Enzeli in safety.

During the month of July 1918, refugees, known as Jelus, numbering 50,000, arrived at Bijar, and were sent from there to Hamadan. They were evacuated in batches of 3,000 down the Persian lines of communication to Ba'quba, where a large refugee camp had been formed.

Earlier in the year certain cases of fever near Baghdad had been seen by Colonel Willcox, who had diagnosed them as cases of typhus fever. They had all been imported from the Jelu

area. Later on similar cases of fever were reported at Ba'quba, which were again diagnosed as typhus. A large quarantine camp was formed, where all refugees were examined as a preventive measure. Few of the medical officers had seen cases of this fever, and had the diagnosis of the nature of the fever not been made by the consulting physician at the time, the disease would probably have spread to the Indian troops, and more especially to the men of the labour corps, whom it was difficult to keep free from lice. These labour corps men were employed in making roads and railways, and if they had become infected an outbreak might have resulted similar to that which

Jelu refugees collected in cage prior to medical examination, Mesopotamia.

occurred in Serbia. As the Jelus were concentrated at Ba'quba, three hospitals and a special disinfecting plant were attached to the camp under the administration of an A.D.M.S. and a D.A.D.M.S.

Immediately after the conclusion of the armistice with Turkey on 31st October 1918, the Commander-in-Chief in Mesopotamia received instructions to reoccupy Baku and the Caspian sea ports. Towards the end of the year troops from the Salonika force landed at Batoum; and Baku* and Krasnovodsk passed out of the command of the Mesopotamian Commander-in-Chief on the last day of December 1918.

* See Chapter V, p. 155.

While these operations were being carried out the formations in Persia were reorganized, and a North Persian Force was formed on 17th September 1918 from Dunsterville's Force. This new force, with headquarters at Kasvin, was under the command of Major-General Sir W. M. Thomson, and consisted of the 36th and 39th Infantry Brigades, the 13th Brigade R.F.A., the 72nd Field Company R.E., the 14th Hussars, and the 39th and 186th Machine Gun Companies. The medical units attached were No. 20 Combined Field Ambulance, No. 40 Field Ambulance and a detachment of No. 16 C.C.S. Major Brunskill, R.A.M.C., was appointed the A.D.M.S. of the force

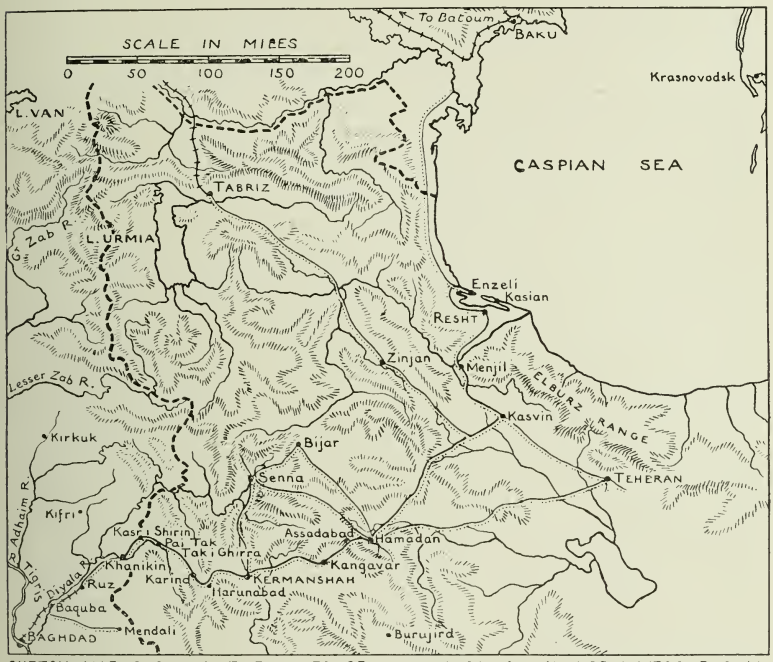
Members of a Jelu "V.A.D." at the Jelu Hospital, Ba'quba.

but was invalided on 22nd September. Lieut.-Colonel E. T. Burke, R.A.M.C., officiated until 9th October, when the duties were taken over by Lieut.-Colonel D. M. Sparkes, R.A.M.C.

The occupied area was an extensive one. The country between Hamadan and Kasvin, roughly 150 miles, was divided into ten marching stages: the country from Kasvin to Enzeli, 142 miles, was also divided into ten marches. To the west the area extended to the towns of Zinjan, Bijar and Senna, in the middle area, and formed its left flank. The roadway leading from Hamadan to Enzeli was a metalled road constructed by the Russians, and had been kept in good repair; it was excellent for horse and motor traffic, but troops

coming up from Mesopotamia, accustomed to soft ground suffered great discomfort when marching on it, and no doubt this was responsible for many men falling out during this part of their long march.

There were posts about every fifteen miles; some consisted of "khans"* roughly converted into shelters, but provided with no latrine or water arrangements for the troops. Others were well built "Russian rest houses," which, though



SKETCH MAP SHOWING THE LINES OF COMMUNICATION IN NORTH-WEST PERSIA

also lacking in sanitary arrangements, afforded better comfort to the troops. Troops drew their drinking and cooking water from any stream or well in the vicinity, but these were liable in every case to be polluted by the Persians who also drew water from the same source.

The country from Hamadan to within twenty miles of Resht, the Persian port on the Caspian, is hilly and barren and the cold is very severe. Twenty miles to the south of Resht the road enters a thickly wooded area and quickly drops to a

* Native rest houses.

lower level till it reaches Resht, where the country is flat. The surrounding district, including Enzeli, is divided up into rice fields, and nearly all the inhabitants of this area appeared to suffer from a severe form of malarial cachexia.

The roads to Zinjan, Bijar and Senna were for the most part very rough, and were impassable for motor and wheeled traffic in wet weather. For this reason it was extremely difficult, and in many cases impossible, to evacuate sick from these areas.

Up to the middle of September 1918 those of the troops who had been in Persia for some time suffered chiefly from malarial infection, the most common type being the malignant tertian. Few of the troops at that period made use of mosquito nets, and no prophylactic quinine was issued. With the exception of the area mentioned above, the country had not the appearance of a malaria-infected area, which probably accounts for the absence of prophylactic measures against this disease.

During the latter half of September 1918 a severe outbreak of influenza occurred in the force. The first cases to be definitely diagnosed occurred in the 1/4th Hampshire battalion when it arrived from Hamadan. Forty per cent. of this unit suffered. The epidemic became general throughout the force and by its infectious nature and severe after-effects a large proportion of the force was rendered unfit. The chief complication was broncho-pneumonia, which in many cases ended fatally. The shortage of warm clothing amongst the troops at that time and up to the middle of November, when the cold in Persia is keenly felt, contributed to the high incidence of pneumonia and to the spreading of the epidemic. British troops were in khaki drill with shorts, some only had an overcoat and few had more than one blanket. No provision had been made for warm clothing till the middle of November 1918 when the epidemic died out among both British and Indian troops.

During September and October 1918 the hospitals were overcrowded and it was necessary to increase the number of beds in the Kasvin Military Hospital from 150 to 500 and in Zinjan from 50 to 150. There was a great shortage of drugs; but this was partly made good by purchase from local chemists who stocked European drugs. These were all bought at exorbitant prices. The shortage of medical personnel was also acutely felt. The hospitals had arrived under strength, it being presumed that the personnel on leave would rapidly be sent up, but on account of the long line of communication and the lack of transport, their arrival was considerably delayed. It was necessary, therefore, to engage Russian nursing sisters

who took the place of the British nursing orderlies; this arrangement, however, presented some difficulties as few could speak English. Arrangements were then made to give priority to all medical personnel and drugs and on their arrival the services of the Russian nursing sisters were dispensed with.

By the end of October, when the influenza epidemic had practically died out, there was a general improvement in the health of the troops at all stations. A convalescent camp was formed at Kasvin for both British and Indian troops, but convalescence following influenza was slow and men had to be retained in the camp for long periods.

The medical service during this period was severely taxed, for not only was it employed in looking after the sick of the force but also in the supervision and treatment of the sick in the large refugee camps which were scattered over the North Persian Force area.

During November 1918 the North Persian Force reoccupied Baku. One brigade took part in this operation, and it was accompanied by No 40 Field Ambulance, which had acted as a military hospital at Kasvin. Its place at Kasvin was taken by a detachment of No. 16 C.C.S. which had been relieved in Hamadan by No. 1 British General Hospital. During the early part of December the British Red Cross Society opened an advanced depôt at Kasvin. This depôt was fully supplied and provided comforts not only for the sick in hospital but also for the troops in the field. Libraries were started and in a very short time the spirits of the troops were considerably higher; help also came from Teheran in the shape of games, cards and books for the hospitals.

The Kasvin Military Hospital was originally started by No. 40 Field Ambulance and consisted of 150 beds, occupying several suitable buildings in one of the large streets of the city. A separate building was set aside for the treatment of Indians, for which Indian personnel were borrowed from the Indian sections of No. 20 Combined Field Ambulance. The hospital was made complete in every way, and an efficient operating theatre and small laboratory were instituted. Beds were purchased locally and were for the most part ordinary Russian iron beds with wooden boards, though some were manufactured locally. The deficiency of blankets was made good by the local purchase of quilted coverlets. When the hospital was expanded to a 500-bedded unit to cope with the influenza cases, extra buildings were taken over in close proximity to

the hospital. A separate building some distance away was obtained for sick officers. It was known as the "Russian Club" and was admirably suited for a hospital; there were disadvantages, however, namely that it was situated at some distance from the administrative block and on account of the shortage of personnel was difficult to administer. Towards the end of December it was decided to move the hospital, then being administered by half of No. 16 C.C.S., to the north of the town, where the whole garrison was stationed. Eight spacious huts were taken over in the rest camp area and these were converted into an excellent hospital. The advantages of the move were that hospital cases were thus transferred from the city area to a healthier site. It was also in close proximity to the troops and was easy of administration.

During September 1918 a small post hospital was opened at Zinjan for the treatment of sick and wounded. By the end of October two Indian sections of No. 20 Combined Field Ambulance were moved up to Zinjan and took over the hospital. At this time a new hutted hospital was being built to accommodate 150 beds.

The hospital which was opened at Bijar had accommodation for seventy patients. Bijar, however, was evacuated on 8th November 1918.

A hospital for British and Indian sick was opened at Enzeli by two sections, one British and one Indian, of No. 20 Combined Field Ambulance. This hospital accommodated fifty British and fifty Indians in huts situated on the sands at Kasian. The site was a healthy one and convenient to the landing stages, and little difficulty was experienced in transferring sick to and from hospital ships.

During November 1918 when the brigade, accompanied by No. 40 Field Ambulance, reoccupied Baku, a spacious building formerly used as a school was taken over as a hospital, with accommodation for 400 patients. The building was heated by Russian stoves and lighted throughout by electricity. The kitchens were provided with oil cookers. The baths were supplied with hot and cold water, and a large laundry was attached to the building. Consequently in a very short time No. 40 Field Ambulance transformed this building into a comfortable hospital.

A portion of the Russian barracks at Krasnovodsk was taken over by a detachment of No. 40 Field Ambulance as a hospital, and accommodated forty cases. It was equipped for the treatment of both British and Indian sick.

When Dunsterville's Force was taken over by the North Persian Force in September 1918, the following medical arrangements existed at Hamadan. Half of No. 16 C.C.S. having arrived in July 1918 from Mesopotamia was stationed there, and was accommodated partly in the American Mission Hospital and partly in tents and in shelters constructed of matting. The personnel consisted of three medical officers, 40 British other ranks and 63 Indian other ranks. The unit was well equipped and possessed 40 iron beds and a complete operating equipment. There was accommodation for 200 beds. During the malaria and influenza outbreaks the numbers increased, and at one time there were over 400 patients in the hospital. In October No. 1 British General Hospital began to arrive and lent assistance in personnel and equipment. It took over the hospital in November, and No. 16 C.C.S. was then transferred to Kasvin.

Small medical posts were opened along the route of evacuation of sick to Hamadan. Refugee hospitals and camps were instituted at Kasvin. During December 1918 a refugee camp was opened in one of the large serais situated in the southern part of the city. This serai could accommodate 500 refugees, the majority of whom were Assyrians. Cooking, disinfesting, bathing and laundry rooms were built, and about six rooms were taken over as a hospital for male and female patients. A separate infectious ward for the treatment of typhus cases was built. Refugee camps were also opened at Enzeli, Baku and Bijar.

Up to the end of November 1918 there was one section of No. 33 M.A.C. with Ford cars located in Kasvin. These cars, together with box cars and lorries, were used for the evacuation of sick and wounded. Owing to continual breakdowns amongst the Ford ambulance cars, the whole of No. 33 M.A.C. including workshops and four heavy cars was sent up. After these arrived the lorries and box cars were only used in an emergency for the evacuation of sick. During December 1918 no sick could be transferred from Zinjan on account of the bad condition of the roads.

The general sanitation of the force in North Persia was satisfactory. In all stations fly-proof latrines had been erected and incinerators built. An improved form of Serbian barrel was recommended for the disinfesting of clothes and was universally adopted. These Serbian barrels were used in Kasvin, Hamadan, Enzeli and Zinjan.

On 27th November 1918 No. 41 Sanitary Section arrived at

Kasvin. The areas occupied by troops were then divided into sections, each section being placed under the charge of a member of the sanitary section who, with the assistance of native sweepers, cleared and burned all litter and refuse. In this way the areas were kept clean. A central disinfecting and bathing station was started close to the rest camp. The bath house was used by small units and by the troops on the march.

Owing to the deterioration of the bleaching powder supplied in tins, a standardized solution of chlorine was prepared and issued instead of the powder in Hamadan, Kasvin and Enzeli. This method for the purification of water supplies proved most satisfactory. All units and troops on the march were provided with the solution in bottles, with instructions as to the quantity of the solution required to sterilize a definite amount of water. There was a plentiful supply of water over practically the whole area, but it was drawn mostly from roadside streams, so that there was constant danger of pollution, and it was only by boiling or chlorinating that any degree of safety could be assured.

From October to December 1918, 56 cases of infectious disease occurred amongst the troops in North Persia. There were 14 cases of typhus, 13 of smallpox, 27 of relapsing fever, 1 of scarlet-fever, and 1 of chickenpox. Ten of the smallpox cases occurred amongst the troops at Zinjan. The infection was probably contracted from the Persian labourers who were working on the new barracks. All necessary precautions were taken and the troops in Zinjan were revaccinated.

Up to the middle of October cases of venereal disease that could not be treated locally were evacuated. In Kasvin a venereal hospital was opened. When No. 40 Field Ambulance left Kasvin for Baku, part of the venereal hospital was closed and only cases suffering from gonorrhœa and soft sores were treated there. Cases of syphilis were sent to No. 1 British General Hospital at Hamadan, where special arrangements for their treatment had been made. Soon after the arrival of the 39th Brigade at Baku the admissions for venereal disease showed a marked increase. No. 40 Field Ambulance opened special treatment rooms and wards for the reception of these cases. Towards the end of December pamphlets on early treatment were received. These were immediately issued and medical officers commenced a series of lectures to the troops. Private ablution rooms were set apart in hospital and in barracks for the use of the troops.

A Persian line of communication was formed about the

1st September 1918, and was given a separate medical administration. Previously the 14th Division had made all medical arrangements for troops on the line as far as Hamadan. The line, about 300 miles in length, extended from Ruz to Hamadan in a north-easterly direction, and from a few hundred feet above sea level at Ruz, rose to about 6,000 feet at Hamadan, with climatic conditions varying from the temperate winter of the plains of Mesopotamia to the severe cold of the Hamadan plateau. The line ran north-east from Ruz to Pai Tak, the character of the country becoming more hilly on the Persian border beyond Khanikin, and from Kasr-i-Shirin upwards the roads undulated between barren hills, except for occasional patches of scrub oak. Roads were the only means of communication, but with the exception of the main caravan route from Khanikin to Hamadan they were mainly tracks unfit for motor traffic. This main road had a fair surface on the whole, but in and near villages was extremely bad. The large amount of motor transport on this line contributed largely to cutting up the surface of the road, and rendered it extremely rough in places for the transport of serious cases of sickness. From Kasr-i-Shirin the road ran through Siripul to Pai Tak, one of the strategical points of the line, and situated at the foot of the Pai Tak pass. The pass is about three miles long with a fairly good surface, though steep, and even in wet weather could be negotiated by motor transport. Tak-i-Ghirra, at the top of the pass, is about 4,000 feet above sea level. Apart from its military importance, Pai Tak was a halting place for troops on the march and a terminus for mechanical transport convoys, so that there was always a considerable concentration of troops in this area. Beyond Tak-i-Ghirra the road rose 2,000 feet in twelve miles to Sermil, a post for Indian troops, and then descended into the Karind valley, passing through Harir, where the rest camp of the 14th Division was established. Karind was a picturesque but dirty village, and a camp was formed a mile to the east of it at the beginning of November 1918 when two mechanical transport companies were stationed. It became the terminus for the distribution of transport during the winter. Harunabad was the next post on the line. It was separated from Hassanabad by the Nal Shikan pass, leading to the Hassanabad plain. The Chehar Zawar range had then to be crossed, and from it the road descended to the Mahidasht plain—a fruitful source of trouble to motor transport in wet weather—and Kermanshah. From Kermanshah to Hamadan the road was equally unsuitable for

sick transport. There was one difficult pass before Kangavar, a village almost midway between Kermanshah and Hamadan. The surface of the pass was extremely rough and the gradient steep, but it was fairly short. Assadabad pass, the largest and most difficult pass on the line, was situated about thirty miles from Hamadan, leading up to the Hamadan plateau by a steady rise of about six miles. After rain the road was impassable for motor transport, and only fit for pack mules. The Hamadan side of the pass was the more difficult as it was steeper, and became a perfect morass in wet weather. Before the Baku–Batoum route had been opened as a means of bringing supplies to the force, it became evident that the Assadabad pass would be a serious obstacle in winter and accordingly an alternative route was arranged, branching off at Kangavar and passing through Husseinabad, a village situated south of the Alvand range. This added about forty miles to the distance, but the new road, though hilly in places, was not under snow during the winter, as in the case of the road through Assadabad pass. It was opened on 28th December 1918, but as hospital accommodation at Hamadan was ample for requirements, and evacuation over long distances during winter was inadvisable for any but the slightest cases, it was very little used by the motor ambulance convoy. Another loop of new road was constructed between Sermil and Karind, where the road ran north-east up to the foot of the mountain range and joined the old road at Karind.

Railhead was moved from Ruz to Qizil Robat in September 1918. At Ruz all sick from Persia were evacuated by rail. At Khanikin, Kasr-i-Shirin and Tak-i-Ghirra there was a section of No. 20 Combined Field Ambulance in tents. Harir had a large convalescent camp formed by one section of No. 21 Field Ambulance, and one section of No. 20 Combined Field Ambulance in tents, and there was a detachment of No. 21 Combined Field Ambulance at Pai Tak.

One section of No. 20 Combined Field Ambulance was at Kermanshah. A suitable house at the south-west end of the town was occupied, and with the assistance of personnel from No. 21 Combined Field Ambulance of the 14th Division about 200 could be accommodated and treated in it.

The inhabitants of this part of Persia were extremely verminous, and three successive waves of invasion, with consequent failure in harvest, had succeeded in causing a high incidence of famine and dirt diseases, principally relapsing and typhus fever, amongst them. In addition, the whole country from

Kasr-i-Shirin upwards had always been malarial. There was a high percentage of splenic enlargement amongst the children, and malarial cachexia was prevalent amongst all classes. Venereal disease was prevalent amongst the women, due largely to the yearly influx of pilgrims and the system of temporary marriages that took place between them and the Persian women, so that large numbers of these women became prostitutes legalized by the temporary marriage, and instead of living in more or less organized brothels, were scattered broadcast throughout Persia. Dysentery and diarrhœa were prevalent to a certain extent.

The position of the villages was regulated largely by the water supply, and the rivers in the vicinity became fouled. Springs were abundant but even these were liable to contamination.

The houses, except in Kermanshah and Hamadan, were little better than Arab huts. Accordingly the large majority of medical units, except those at Kermanshah and Hamadan, remained in tents or huts.

The difficulties of medical organization on the Persian lines of communication were such as might be expected in a country with 300 miles of very indifferent roads, and with troops strung out along the line at small posts. The units, particularly those engaged on road construction, were spread over several miles of road, thus necessitating more medical personnel with each unit and a close medical supervision of detached parties. Regular evacuation, which had been possible during the summer, was considered impracticable above the Pai Tak Pass in winter, and accordingly medical units had to be ready to accommodate convalescents in addition to sick and wounded.

Some difficulty was experienced in constructing incinerators, water tanks and other works. Bricks were not easily obtainable as nearly all brick kilns had been closed, and mud walls were shown to be of very little use during the rains. Hutting in general was not a marked success except at Hamadan, and hospitals at outlying stations where no permanent buildings were suitable had to be located in tents. In any case, it was decided not to construct any huts at or below Pai Tak. Pai Tak, situated as it is at the foot of the pass, was subject to gales, occasionally of sufficient force to blow the tents down ; but a tent surrounded by a mud wall, about two feet high and well drained, was fairly comfortable and safe. Fuel consisted mostly of wood, though locally-made coal and mud briquettes could occasionally be obtained.

All the medical units along the line received both British and Indian sick. A general hospital was established at Hamadan, the base for the North Persian Force and the point at which evacuation of sick would cease in winter. A medical unit was also required between Hamadan and Kermanshah, not only to deal with sick in the area but to form a resting place for cases evacuated from Hamadan to Kermanshah. Owing, however, to the cessation of hostilities and the proposed change of route of evacuation, a medical post with accommodation for twenty cases was considered sufficient.

Pai Tak, as the next stage of evacuation of sick from Karind, required accommodation in proportion. Medical units capable of accommodating 50 and 100 cases were required at Kasr-i-Shirin and Khanikin respectively, but the question of units of a stationary character was not important below Pai Tak pass, where evacuation could be carried out without much difficulty and railhead was constantly advancing. A sanitary section and a motor ambulance convoy with the addition of heavy ambulance cars to negotiate the passes were also essential. Scattered posts on the line each required a medical officer or capable Indian subordinate with a small detachment of British and Indian personnel and accommodation in huts or tents for about twelve cases. In addition, a convalescent camp at Kermanshah was established. One had already been instituted at Hamadan in September.

The local resources of Persia for improvising hospital equipment such as bedsteads, bedside tables and latrine boxes were poor, and the quality of these articles when finished was inferior and flimsy. Bedpans, instruments and emergency drugs were almost impossible to obtain and articles of medical comfort extremely scarce, so that local resources could not be relied upon in an emergency.

One of the most interesting features of the operations in North-West Persia was the relief measures adopted when the Turks captured Tabriz and invaded the districts around lakes Urmia and Van. In this area of northern Persia nearly every man is armed, and a certain show of resistance was made by Syrian and Armenian irregulars, but this soon gave way before the organized Turkish troops and thousands of refugees came streaming down the roads leading to Hamadan seeking British protection. Men, women and children of all ages, with such of their horses and cattle and household goods as they could save, converged on Hamadan from Bijar. To permit a disorganized mob, armed and already suffering from a high incidence

of infectious disease, to enter a large town like Hamadan, occupied by British troops and with a civilian population already famine stricken, would have been courting disaster, and they were accordingly headed off by the troops and collected at Yanghikhan, a small village about fifteen miles from Hamadan. They were disarmed, catered for, and those requiring medical assistance received it. From Bijar, one of the towns on the route from Urmia, reports had been sent that cholera and smallpox were raging. Measures were consequently taken to segregate the refugees as far as possible and to prevent the spread of infection among them and also to the troops and civilian population. It was decided to collect the refugees at the isolated position of Yanghikhan. Here a large double serai was taken over as the hospital, and was fitted out with local and medical equipment, and drugs were obtained from No. 16 C.C.S. A dispensary for out-patients was instituted, and a medical officer and some personnel were obtained from No. 1 British General Hospital, and together with two Armenian doctors, a Russian lady doctor and two nurses they made a nucleus from which to start. For cooking, wardwork and water-carrying personnel was obtained from amongst the refugees themselves. It was impossible to carry out disinfection on a large scale. Clothing was unobtainable, fuel was scarce, and only hospital patients could be bathed and clothed.

As far as possible newcomers were kept in one section of the camp and inspected before being allowed to join the main camp, but even this was difficult as they descended from all parts of the country and only a few troops were then available to concentrate them. Principles of sanitation were non-existent among them, and the greatest difficulty was experienced in this respect. Medical officers were sent from Ruz to assist in looking after the sick. Refugee camps were established along the line to Ba'quba, where they were to be congregated, and sections of the line were allotted to medical officers to look after the sick and stragglers.

Fortunately the weather was fine, and though dysentery and diarrhœa were practically universal amongst them, very little cholera was seen. Smallpox did not appear to attack the adults to any extent, although a fair proportion of the children was affected. Typhus and relapsing fever were common, and with the debilitated state of the refugees contributed largely to the high mortality among the sick. They were gradually evacuated, some by lorries and vans, but the majority on foot.

With regard to disease amongst the personnel of the British Force, it is interesting to record an outbreak of malaria, where typical malarial rigors and temperatures were absent. Several fatal cases of a doubtful character occurred at Harir convalescent camp. Acute jaundice and coma were the main symptoms. There was no blood or albumen in the urine, and hyperpyrexia was not a feature of the disease. There was no microscope available for blood examinations at Harir ; accordingly post-mortem specimens were sent to Baghdad for examination. Subsequently, at various parts of the line, sudden deaths occurred with varying symptoms. In some of these cases jaundice was present, and where blood slides were examined the parasite of malignant tertian ague was nearly always found. Stringent prophylactic measures were therefore taken.

The high malarial incidence on the Persian lines of communication was to a certain extent masked by the outbreak of influenza which spread to Kermanshah from Mesopotamia during the latter half of September. Its infectivity was remarkable, and within a day or so of the onset pneumonic symptoms developed in some cases. Its severity was not so marked in British as in Indian cases, but in the cases reported from Tak-i-Ghirra to Assadabad there was a fairly high death-rate from pneumonia. At Hamadan the death-rate was higher. There were 350 Indians and 250 British admitted to hospital on the Persian lines of communication, excluding Hamadan, which was then under the administration of the North Persian Force, with 20 deaths. The epidemic was most severe in the last week of September and subsided quickly after that.

After a brief interval typhus and relapsing fever began, the former being chiefly prevalent among British ranks, the latter among the Indians ; but in neither case was there anything approaching an epidemic. Though the prevalence of lice among British troops was very low, isolated cases continued to arise. The Indians, even when thoroughly disinfested, were easily reinfested from sleeping on the ground and associating with the Persians. Ford drivers, who transported Jelus, were among the first attacked. The Jelu serai in Kermanshah was responsible for a good many cases, and most of the sanitary orderlies who worked there contracted typhus fever, although they did not sleep or have their meals there. Sexual intercourse with the Persian women and consequent louse-infection was undoubtedly responsible for a certain number of cases.

Typhus fever gradually increased towards the end of November, and during December the curve gradually mounted till the 31st of the month, when there were fifteen cases on the Persian lines of communication. Relapsing fever appeared about the same time in November, and gradually increased towards the end of December, when there was a total of twenty-one cases on the lines of communication.

CHAPTER XVII.

THE OPERATIONS IN EAST AFRICA IN 1914 AND 1915

THE medical history of the East African Campaign has outstanding points of interest peculiar to itself. There was little or no trench warfare, the country was suitable for manœuvring, and the actions for the most part consisted in wide turning movements entailing long marches and great physical fatigue. It became more and more a campaign against climate, geographical conditions and disease. These factors had to be carefully considered by the General Staff. To appreciate the problems that had to be faced, the terrain, the peculiarities of the tropical climate and the composition of the British and enemy forces must be borne in mind.

German East Africa was the greatest of Germany's colonies, and much money had been expended on its development and in preparations against invasion. The German Commander-in-Chief conducted its defence with energy and brilliance. The northern frontier of the colony ran from the coast south of Mombasa to just south of the snow-capped mountain, Kilimanjaro, and then round its north-eastern slopes to Lake Victoria Nyanza, of which two-thirds were in German territory. On this boundary the Germans were protected from British East Africa by the Usambara and Paré mountains, extending for 130 miles from the coast. Westward the boundary extended along the eastern shores of Lakes Kivu and Tanganyika and the north-eastern shore of Lake Nyasa, a distance of some 700 miles. The country between the two former lakes is mountainous. In the south-west a mountain range also closes the gap between Lake Tanganyika and Lake Nyasa. The Nguru, Uluguru and Mtumbi mountain ranges lie across the country from north to south. German East Africa was bounded on the north and partly on the west by British colonies, while the remaining part of the western boundary adjoined the Belgian Congo. To the south lay Portuguese Mozambique. The colony was over 384,000 square miles in extent, or twice the size of Germany. It was occupied by about eight million people, five thousand of whom were white. Its coast-line extended for 620 miles and

possessed four main ports, Lindi, Kilwa, Tanga and the capital, Dar-es-Salaam. The islands of Pemba and Zanzibar, under British protection, dominated the northern part of the coast line. Two railways ran from the coast into the interior. These were the Usambara Railway, running from Tanga and skirting the precipitous slopes of the Usambara and Paré Mountains to Moschi, situated under cover of Mt. Kilimanjaro, a total distance of over 200 miles ; and the Central Railway, running from Dar-es-Salaam via Tabora to Ujiji on Lake Tanganyika. The latter was only completed in February 1914 and was 780 miles in length. The geographical features of the colony are shown in the sketch map.

SKETCH MAP OF GERMAN EAST AFRICA

The difficulties associated with military operations in East Africa are best summed up in General Smuts' own words :—

"It is impossible for those unacquainted with German East Africa to realize the physical, transport and supply difficulties of the advance over this magnificent country of unrivalled scenery and fertility, consisting of great mountain systems alternating with huge plains ; with a great rainfall and wide unbridged rivers in the regions of the mountains, and insufficient surface water on the plains for the needs of an army ; with magnificent bush and primeval forest everywhere, pathless, trackless, except for the spoor of the elephant or the narrow footpaths of the natives ; the malaria mosquito everywhere except on the highest plateaux ; everywhere belts infested with the deadly tsetse-fly which makes an end of all animal transport ; the ground almost everywhere a rich black or red cotton soil, which any transport converts into mud in the rain or dust in the drought. In the rainy seasons, which occupy about half the year, much of the country becomes a swamp and military movements become impracticable. And everywhere the fierce heat of equatorial Africa, accompanied by a wild luxuriance of parasitic life, breeding tropical diseases in the unacclimatized whites. These conditions make life for the white man in that country far from a pleasure trip ; if, in addition, he has to perform real hard work and make long marches on short rations, the trial becomes very severe ; if, above all, huge masses of men and material have to be moved over hundreds of miles in a great military expedition against a mobile and alert foe, the strain becomes unendurable. And the chapter of accidents in this region of the unknown : unseasonable rains cut off expeditions for weeks from their supply bases ; animals died by the thousand after passing through an unknown fly-belt ; mechanical transport got bogged in the marshes, held up by bridges washed away or mountain passes demolished by sudden floods. And the gallant boys, marching far ahead under the pitiless African sun with the fever raging in their blood, pressed ever on after the retreating enemy, often on much reduced rations and without any of the small comforts which in this climate are real necessities. In the story of human endurance this campaign deserves a very special place."*

The forces operating in East Africa during 1914 consisted chiefly of Indian troops. They included one regular British infantry battalion, the Loyal Regiment (North Lancashires), and some units raised locally. When German South-West Africa was conquered, South Africa agreed to provide additional troops for the subjugation of German East Africa, and a number of complete self-contained formations were landed in British East Africa. Gradually the troops raised locally, the brigades and reinforcements from South Africa and additional troops from India, the United Kingdom and elsewhere, were amalgamated. It was natural that from time to time reorganization of the forces should take place to secure the smooth and harmonious working of this heterogeneous army.

At first the force was only the equivalent of a division, then it was extended to two divisions, and with these General Smuts commenced his operations when he took command in the beginning of 1916. They were not, however, the equivalent

* "General Smuts' Campaign in East Africa" (Brig.-General J. H. V. Crowe, C.B.) : Introduction by General Smuts.

of two divisions on the Western front, and would represent probably only seventeen thousand rifles. As the campaign developed the force was composed of brigades of infantry and batteries of artillery from South Africa ; one regular British infantry battalion ; one British regiment (25th Bn. Royal Fusiliers, New Army) known as " Driscoll's Scouts " ; regular battalions of Indian infantry ; a squadron of cavalry from a regular Indian cavalry regiment ; Imperial service troops from Kashmir, Jhind, Kapartala, Bartpur and Faridkot ; regular battalions of the King's African Rifles of British East Africa ; British corps formed by settlers in Rhodesia and East Africa ; a mounted corps formed by the Boer settlers in British East Africa and known as " Belfield's Scouts " ; a detachment of Arabs from the coast ; a corps of scouts raised in Uganda and many thousands of native porter corps raised locally.* At a still later date regiments arrived from the Gold Coast, Nigeria and the West Indies. It is not surprising that General Smuts should describe his force as being drawn from almost every continent and speaking a babel of languages ; nor can it be said that such a force, with supplies, transport and equipment drawn from the United Kingdom, India, the Union of South Africa, British East Africa and Uganda was a simple one to organize. The medical services in East Africa were gradually built up to meet the needs of the force, and it is instructive to note the measures taken or neglected in the medical organization during the campaign.

The personnel available for the German army in East Africa has been estimated at three thousand whites and twelve thousand African natives. This personnel was organized into companies of 162 men each. Each company was divided into three platoons of fifty men, and had two to four machine guns and its own transport consisting of 322 porters. In addition to ammunition, supplies and medical stores, these porters carried an aluminium boat in sections and a collapsible boat for crossing rivers. They lived largely on the country and were consequently very mobile. Although the German force was cut off from overseas supplies, the commander showed his indomitable spirit and power of organization by manufacturing locally benzine spirit, paraffin and gas from copra. A spirit labelled whisky was made and issued as a ration to the troops. The enemy were able to augment their supplies by

* The following were also attached to the force : Sir John Willoughby's Armoured Cars, a Territorial Cornish Heavy Battery, and detachments of R.F.C. and R.N.A.S. (later R.A.F.).

the manufacture of foodstuffs such as cocoa, chocolate, oils, margarine, jam and fruit juices, and a supply of locally grown tobacco was available. They produced clothes, ropes and string, and rubber articles from local materials, and tanned leather for the making of serviceable boots. They had factories also for supplying quinine* for malaria cases and all the ammunition they required for their campaign.

The total British force in East Africa and Uganda during the first three weeks of the war numbered twelve hundred. It was composed of the King's African Rifles and their reserves ; the Uganda Royal Volunteers ; some Somali Scouts ; a few Arabs ; the Nyasaland and North-East Rhodesian police, along with a few settlers, both British and Boers, who volunteered for service.

The first fighting took place on the frontier at Karonga, a British town on Lake Nyasa in Northern Rhodesia, at Abercorn in North-East Rhodesia and intermittently all along this frontier. In September 1914, Brigadier-General J. M. Stewart, with a weak Indian brigade was sent from India to British East Africa, and he then assumed command of all the forces in the colony. Meanwhile the Germans had occupied Taveta, a British town situated under Mt. Kilimanjaro near the German town of Moschi, and also Tanga near Mombasa, and they were raiding the Uganda railway in the neighbourhood of Maungu. Shortly after the arrival of General Stewart, the Germans sent a force 600 strong to the Tsavo river. An engagement took place five miles from Tsavo bridge, and the enemy force was driven back. The British troops then established posts at Mzima and Campiya Marabu. On 10th September the Germans occupied Kisi, near Victoria Nyanza, but they were soon driven out and retired to Karungu. During the remaining weeks of September several German attacks were launched in the north, the most noteworthy being their advance along the coast from Tanga to Mombasa.

On 1st November 1914 another Indian Expeditionary Force, approximately 7,000 rifles strong, under the command of Major-General A. E. Aitken, arrived on the East African coast, and next morning summoned the German port of Tanga to surrender. The German commander asked for and obtained time to consider the proposal. He employed the interval in bringing troops to Tanga by the Moschi–Tanga railway. During the evening of 2nd/3rd November, British troops were

* The Germans were continually asking for quinine for the use of British prisoners in their hands, and considerable quantities were supplied during 1915 by the British medical authorities.

landed and attacked the town. The defenders had effectively prepared their positions, and the attacking force was compelled to retire. The main force was landed on the 4th November, and at 1 p.m. the attack was renewed but the British force was again driven back and had to re-embark. The casualties were estimated at 800. When the troops re-embarked medical personnel was left behind to attend to the casualties, and when an armistice was arranged most of the cases were evacuated.

Early in January 1915 the Germans again advanced along the coast from Tanga and occupied Jasin. They were thrown back by a British detachment, but on the 20th they again attacked Jasin with 2,000 men, and after a strenuous fight compelled the garrison to surrender. After this defeat the British troops occupying the Umba valley and outlying positions in German East Africa were recalled, as the lines of communication were long and the area a hot-bed of disease. The total casualties during the operations in the Umba valley were 80 killed, 222 wounded, 463 prisoners of war and 168 missing. There is no record of the number of casualties from sickness, but the general officer in command states that the amount of sickness was truly alarming and threatened at one time to immobilize the force.

In February the British occupied Mafia island, which lies opposite the mouth of the Rufiji river, and on the 26th of that month they began a complete blockade of the whole coast. At the end of April Major-General M. J. Tighe was placed in command of the British force in East Africa. At that time the force consisted of one regular battalion of British infantry, seven battalions of regular Indian infantry, four battalions of Imperial service troops, one squadron of a regular Indian cavalry regiment, artillery, Royal Engineers, irregular corps, and the following medical units :—

British Units (*Indian Establishment*) :—No. 32 British Stationary Hospital, equipped for 50 patients ; half a section of a British General Hospital, equipped for 50 patients.

Indian Units :—An Indian General Hospital, equipped for 300 patients ; two sections of No. 140 Indian Field Ambulance ; Nos. 120 and 139 Indian Field Ambulances.

Combined Units :—No. 6 General Hospital, equipped for 50 British patients and 300 Indian patients ; No. 26 Field Ambulance, equipped for 200 patients ; No. 38 Sanitary Section ; No. 9 X-ray Section, and No. 2 Advanced Depôt of Medical Stores.

There were also several East African improvised medical units.

On General Tighe's staff there were an A.D.M.S., a D.A.D.M.S. and a medical officer for the Imperial service troops.

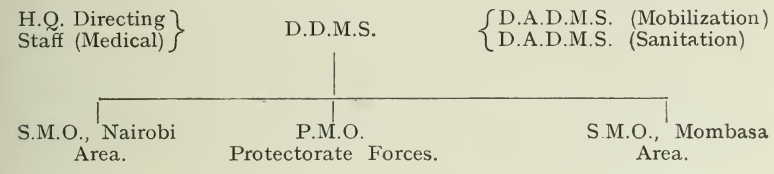
During the summer of 1915 there was desultory fighting but no incident of any great importance. German attacks on the Uganda railway were repeatedly made, but were uniformly unsuccessful. At the end of May the British captured Sphinxhaven on Lake Nyasa. On Victoria Nyanza, a force commanded by Brigadier-General J. M. Stewart, and consisting of detachments of the Loyal Regiment (North Lancashires), the 25th Royal Fusiliers ("Driscoll's Scouts") a unit raised locally and the King's African Rifles, defeated the enemy at Bukoba on 25th June. The total casualties sustained by this force were 7 killed and 25 wounded. In June and July the Germans again attacked Abercorn but were beaten off, and towards the end of August they retired from Victoria Nyanza. Early in September they advanced in the south from Bismarckburg and Neu Langenburg against Rhodesia, but they made little progress. In November, however, they advanced once more in the north, regained Longido and took Serengeti, east of Taveta. In December they rushed Kasigao, a small base seventy miles from Mombasa, and menaced the Uganda railway.

During the summer campaign the East African Force suffered from flies and other tropical pests, and had to be continually on their guard against lions, hippopotami and other wild beasts. Malaria and dysentery were exceptionally prevalent.

A detailed account of the medical arrangements during these small and widely separated operations would be unwieldy and disconnected. It will serve a more useful purpose to outline the scheme of reorganization that was considered necessary, noting the difficulties that brought about the reorganization.

On 14th December 1914, at the time of the amalgamation of the two Expeditionary Forces from India with the Protectorate troops, no comprehensive form of medical organization existed in British East Africa and Uganda. Irregulars and volunteers with temporary local rank superseded commissioned officers of the regular forces; many field medical units were without ambulance transport and personnel, and the dispositions of field medical units as well as base hospitals were not in conformity with recognized army principles. It therefore became necessary to reorganize the medical service for British East Africa and Uganda.

A medical staff for the efficient working of the different areas and lines of communication was organized by the General Staff as follows :—



As the lines of communication were numerous and incoordinated, it was essential that each brigadier in charge of an area should have a senior medical officer to assist him. The appointment of a base medical officer was inaugurated in each area in order that the senior medical officer might be free to accompany the brigadier up the line to the front and at the same time to have an assistant at the base who would be in communication with divisional headquarters.

Previous to the amalgamation, Lieut.-Colonel A. D. Milne, Principal Medical Officer, Protectorate, held the post of Director of Medical Services of the second Indian Expeditionary Force and all the volunteer troops. He administered the medical service from the beginning of the war. He had little experience of military organization, yet his medical dispositions to meet the urgent requirements on the outbreak of war served a useful purpose, although not carried out in the orthodox manner. Under the new organization, however, the appointment held by him could no longer exist, and he was appointed Principal Medical Officer of the Protectorate Forces in British East Africa.

On the outbreak of war an East African Medical Service, including three sections of an East African field ambulance, was formed by Lieut.-Colonel Milne, and temporary military rank was given to the officers, with precedence according to service in the civil department. As already stated, these volunteer officers often superseded the commissioned medical officers of the regular army. This difficulty was overcome by transferring Protectorate medical officers to areas where only Protectorate troops were stationed, or to some appointment where their duties would not clash with those of the regular officers. A command order was issued to the effect that volunteer officers with temporary commissions should take precedence in the East African Medical Service only, and not outside it, and that in no case could a temporary officer supersede

a commissioned officer of the regular army of the same rank. Ultimately, these temporary commissions were recognized by the War Office.

As the field medical units of the second Expeditionary Force and the Protectorate troops were the only medical units with any ambulance transport, the whole question of transport had to be reconsidered. An African Bearer Corps about 1,000 strong was formed, with Lieut.-Colonel Milne as commanding officer. The Zanzibar coast porters made the best stretcher-bearers, and on enlistment the men underwent one month's training under Captain Williams of the East African Medical Service. No single scheme of wheeled ambulance transport could be arranged to meet all situations and requirements. Some areas were infested with flies, while others were not ; and some areas had roads of sorts, while others consisted of thick bush with only jungle paths. To meet these varied conditions, rickshaws, wheeled stretchers, motor ambulance cars, cape-carts and mono-wheeled stretcher carriers were obtained. The mono-wheeled stretcher carriers were used on the jungle paths during thick bush warfare. Each section of a field ambulance was equipped with sixty stretcher-bearers, with stretchers and wheeled ambulance transport suitable for the area in which it was working, and each section could deal with twenty-five casualties. Besides this ambulance transport, an ambulance train was organized for the divisional lines of communication on the Mombasa–Nairobi railway, and hospital ships were improvised for the sea and lake districts.

The combined general hospitals were placed at Nairobi, the headquarters of the base and the centre of the lines of communication. Sections "A" and "C" of No. 6 Indian General Hospital were brought up from Mombasa and opened out under canvas for the reception of Indian patients. "E" Section took over the corrugated iron buildings which had been erected for Indian patients near the civil hospital.

The native civil hospitals were ordered to reserve fifty beds for African troops, and these were staffed by personnel of the East African Medical Service. The European civil hospital was ordered to set apart thirty beds for the use of the force, and these were reserved for surgical cases and staffed by the personnel of the combined general hospital. The Kijabe Sanatorium, situated north-west of Nairobi, which had been a German institution, was taken over, staffed and equipped for forty European medical cases.

Three convalescent homes were opened at Nairobi and were attached to the combined general hospital. " Lady Colville's Home " was given rent-free for the use of the troops and was managed by Lady Colville. At first there was no proper jurisdiction exercised over the admissions to this home, and anyone who applied was admitted on no other documentary evidence than a form usually reserved for general or sick leave. In no case was the admission noted in the hospital book as a transfer. There was no distinction in rank, and all those admitted, whether British officers, other ranks, or seamen of the Navy, lived and dined together. This home was reorganized and placed on a proper basis under the orders of the officer commanding the combined general hospital, and it was reserved for British rank and file. The " Bowring Convalescent Home " consisted of three rooms in the house of the Hon. C. C. Bowring, and was reserved for British officers. The " Gwalior Convalescent Home " had accommodation for six British officers and fifty Indian rank and file. It was the gift of the Maharajah of Gwalior, and was under the administration of Major Southon, I.M.S.

There was, in addition, a small hospital and convalescent home provided by Captain Macmillan, who held a commission in the 25th Royal Fusiliers. At a later date another convalescent home was opened by Lady Llewellyn.

As the medical officers serving with the forces were mainly civilian doctors, a summary of the executive duties of medical officers in the field, as well as those of senior medical officers in command of field ambulances, was prepared and circulated to all medical officers.

The original dispositions of medical units on the different lines and areas were rearranged, and many field ambulances were transferred to different lines, as certain areas were too thinly supported and in others clearing hospitals were in advance of field ambulances. On most of the internal lines of communication, previous to the amalgamation, sections of field ambulances and clearing hospitals had been opened out and their ambulance transport distributed at various posts along the lines. The sick were sent from one ambulance to another without any organized method, or without authority having been given to move them. As the medical service of the force was dealing mainly with sick casualties and no large active operations were expected, it was decided to continue this slow transfer from one post to another on the understanding that only cases that were not likely to recover within

four days should be evacuated. The officer commanding the field ambulance in a front area, however, was instructed to ascertain first whether there was any accommodation available before sick were transferred to the unit behind. The sick ultimately reached the advanced base rest hospitals and stationary hospitals at the railhead or advanced base, where they remained until transferred to the general hospitals by orders of the D.D.M.S.

Each area was reorganized with its own line of communication, and usually had a railhead or advanced base. At each railhead or advanced base there was a base medical officer who was responsible for the administration of the line, under the orders of his senior medical officer, but all movements of sick and wounded from advanced base to general hospital were controlled by the D.D.M.S.

In Uganda a similar organization had been adopted, with Lieut.-Colonel Hodges as Director of Medical Services, Uganda. This appointment was likewise abolished, and Lieut.-Colonel Hodges was appointed Assistant Director of Medical Services, Uganda Protectorate. Uganda was at some distance from headquarters and a separate Protectorate, and the force there consisted of Indian Expeditionary Force troops, some Belgian Congo troops and the Protectorate troops. These troops were therefore reorganized as an independent brigade for medical administrative purposes. The original medical arrangements in Uganda were unsatisfactory, and the three field ambulance sections which should have supported the troops in the field had not been mobilized. The troops were supported by field dispensaries, stationary hospitals and posts staffed by the medical personnel of the field ambulances. Lieut.-Colonel Hodges was ordered to reorganize his medical arrangements, to mobilize the three field ambulance sections on the Indian scale, and to establish a clearing hospital at the Lake Base (Sango Bay), with his main base hospitals at Kampala and Entebbe. By this method he was able to administer his medical units with efficiency. All medical requirements and requisitions were submitted to him as head of the department. His two main lines were the Kagera (Kiasimbisango Bay) Line and the Kabele–Mbrara Line. Two sections of a field ambulance were stationed on the former and one section on the latter

A base depôt of medical stores was stationed at Nairobi, while field depôts of medical stores were opened at Voi, Kajiado and Mombasa. Indents for replenishing medical and surgical

panniers were sent to these field depôts for compliance ; and to facilitate replenishing, small advanced field depôt stores were placed at railhead or advanced base in charge of a subordinate medical officer who obtained his supplies from the base depôt. Special instructions were issued on this subject to medical officers concerned.

Headquarters of the sanitary section were stationed at Nairobi and sanitary squads posted to different areas. This section had to be augmented by additional sweepers from India.

Early in 1916 General Smith-Dorrien was appointed to command the forces in East Africa, but he retired on 10th February on account of ill-health, and General Smuts was chosen to succeed him. Before the arrival of the latter in East Africa the British forces recaptured Serengeti Camp and Longido. Early in February the Germans evacuated Kasigao but retained Taveta. A British assault on Salaita, east of Taveta, on 12th February failed, the casualties numbering 170. Large reinforcements from South Africa and additional troops from India were constantly arriving. The branch line of the Uganda railway from Voi was in process of being completed, and arrangements had been made for concentrating a large force in the Mbuyuni area. A water pipe line which supplied 45,000 gallons of water daily had been laid from Bura to Serengeti. The camp there, however, required 100,000 gallons of water daily, and the pipe supply had to be augmented by the use of railway and storage tanks. Transport had been accumulated and in the region of this new railway there were 3,600 motor vehicles. Petrol dumps were organized and rapidly built up.

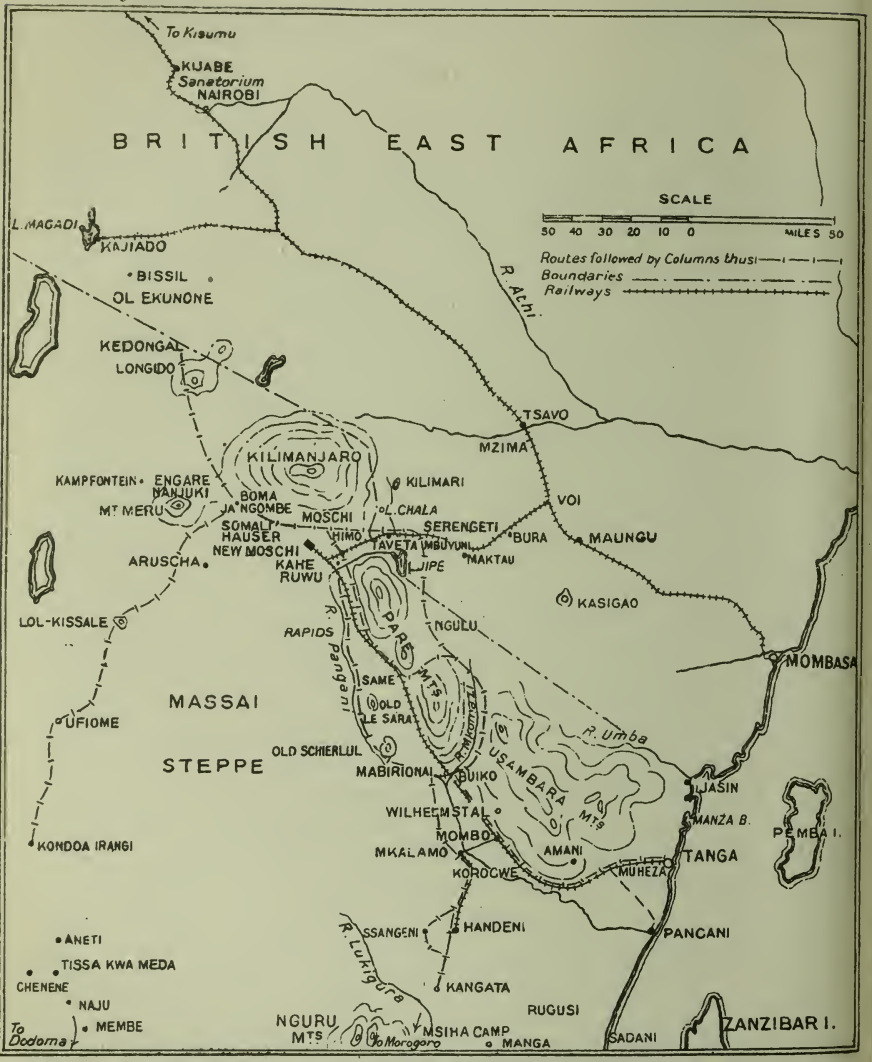
CHAPTER XVIII.

THE OPERATIONS IN EAST AFRICA IN 1916.

WHEN General Smuts arrived at Mombasa on 19th February 1916 the enemy occupied a considerable tract of British territory at Taveta. Major-General Tighe had made preparations for offensive operations to be undertaken against the German force in this area. The Director of Medical Services, Surg.-General G. D. Hunter, appointed by the War Office, had arrived in the country in January and made a rapid survey of the medical position. The number of hospitals on the lines of communication was deficient, and as the D.M.S. of the Union Force at Pretoria had difficulty in mobilizing any additional hospitals, the War Office sanctioned the transfer of a 400-bedded stationary hospital from Egypt. This hospital was due to reach Mombasa before 1st March on board the H.S. " Ebani." The D.M.S. had to contend with other difficulties. The motor ambulance convoy which he had asked for was still on board a transport on the high seas. Some of the South African field ambulances had arrived in advance of their transport and were therefore immobile for field work. Reinforcements of subordinate medical personnel from India were difficult to obtain, and the sanitary sections promised by South Africa and the War Office had not yet arrived. The sanitary supervision of the areas was not adequate in view of the forthcoming active operations. The hospitals on the lines of communication were full, as there had been some difficulty in transferring the sick and wounded to the port of embarkation, Mombasa. To ease the situation the D.M.S. obtained permission to retain the H.S. " Ebani " at Mombasa for a few days until the British and Union sick and wounded could be transferred there for evacuation to Capetown. He also recommended the headquarters of the force to cable to India for the H.S. " Assaye," to enable him to evacuate the sick and wounded Indians to India.

General Smuts decided that, owing to the near approach of a rainy period, he would attack the German forces in the Kilimanjaro district. He concentrated the 1st Division, less the 1st South African Mounted Brigade, at Longido ; the 2nd Division, less detachments, at Mbuyuni and Serengeti, and the 1st South African Mounted Brigade at Mbuyuni ; with artillery

To face page 429.



SKETCH MAP OF THE NORTHERN AREA OF GERMAN EAST AFRICA

1326 Maclay & Sons, Lith.

at Mbuyuni and Serengeti. The 2nd South African Infantry Brigade and some artillery were retained as reserves. The task of the 1st Division was to cross the thirty-five miles of waterless bush between Longido and the Engare Nanjuki river, to hold the river and continue the advance between Mount Meru and Mount Kilimanjaro to Boma-Ja-Ngombe. The 1st South African Mounted Brigade and the 2nd Division were to advance through the gap between Mount Kilimanjaro and the Pare hills against the enemy's main force, which was concentrated in the neighbourhood of Taveta. It was estimated that the total German force would number 6,000 rifles, with 37 machine guns and 16 guns.

The medical units allotted to the 1st Division were " B " and " D " Sections of No. 120 Indian Field Ambulance, " B " Section of No. 140 Indian Field Ambulance, and two improvised East African field ambulances. To the 2nd Division were attached Nos. 2, 3 and 4 South African Field Ambulances along with a section of No. 120 Indian Field Ambulance. All these ambulances were deficient in transport. The evacuation of casualties, which it was estimated would number about 1,000, was controlled by the D.D.M.S., Lines of Communication, who ordered " D " Section of No. 22 Indian Clearing Hospital to proceed to Maktau, where it would unite with " B " Section of the same unit to form one casualty clearing station. This station was to receive sick and wounded from all the forces except the 1st Division. For the reception of cases from this division, " A " and " C " Sections of No. 22 Indian Clearing Hospital were united to form one station at Longido West. In addition, No. 33 British Stationary Hospital was moved from Kajiado to Longido West, and two sections of the South African General Hospital were moved from Kajiado to Kedongal to receive casualties from the forward hospitals, while small post hospitals were formed at Bissil, Ol Ekunone and Namanga, to supply medical assistance and food to the convoys of sick passing between the forward hospitals and the South African General Hospital. The method of conveying sick to the clearing stations at Longido and Maktau was to be by the motor ambulance convoy which was expected to arrive before the actual fighting commenced, and cases were to be evacuated from Maktau to Voi and from there to Nairobi by the one ambulance train available and by auxiliary ambulance trains temporarily improvised for the evacuation of the sick and wounded. This was the first operation for which any co-ordinated scheme of evacuation was drawn up by the administrative medical officer

on the lines of communication. Previously the various divisions or formations had arranged and controlled their own system of evacuation. When this regular system was inaugurated, formations at the front were still apt to interfere and had to be reminded that they were no longer responsible for the evacuation of cases from field ambulances to clearing hospitals.

With regard to the actual operations, the 1st South African Mounted Brigade and the 3rd South African Infantry Brigade arrived simultaneously at the Lumi river, east of Lake Chala, on 8th March, and General Van Deventer concentrated his troops here, while the 3rd South African Infantry Brigade and

Banda-building, Kilwa Kissiwani.

the reserves halted astride the river. Meanwhile the 2nd Division, under Major-General Tighe, bombarded Salaita, and the enemy withdrew to Taveta. On the 9th March the division advanced to the attack, whereupon the enemy withdrew from Taveta and took up a position at the Latema-Reata Nek. After a sharp engagement, which cost the British force 270 casualties, the enemy withdrew from the Latema-Reata Nek and retired in the direction of Moschi and Kahe. Effective pursuit was impossible through the dense tropical forests which stretched from Kitowo to Kahe, and the first phase of the battle of Kilimanjaro thus came to a conclusion. General Van Deventer occupied Moschi unopposed on the 13th March. He concentrated the 2nd and 3rd South African Brigades at Himo

Bridge,* the remainder of the 2nd Division being located at Taveta. The 1st Division, moving from Longido, joined Van Deventer at New Moschi on the 14th.

The 1st Division had had a strenuous march but little fighting. Their main difficulty arose from transport, on account of the impassable roads and the destruction of all bridges by the enemy, particularly across the ravines of the south-west slopes of Kilimanjaro to Boma-Ja-Ngombe. The division suffered only thirteen casualties, and the troops stood the march well. Ultimately, all their sick and wounded were transferred by motor ambulance to Longido. The medical

Banda living hut completed, Kilwa Kissiwani.

units of this division were apparently equipped with the variety of transport noted in the previous chapter. Rickshaws were found to be useless ; mono-wheel stretcher carriers might have proved useful had they been fitted with solid tyres. The ambulance wagons drawn by eight mules were the most satisfactory.

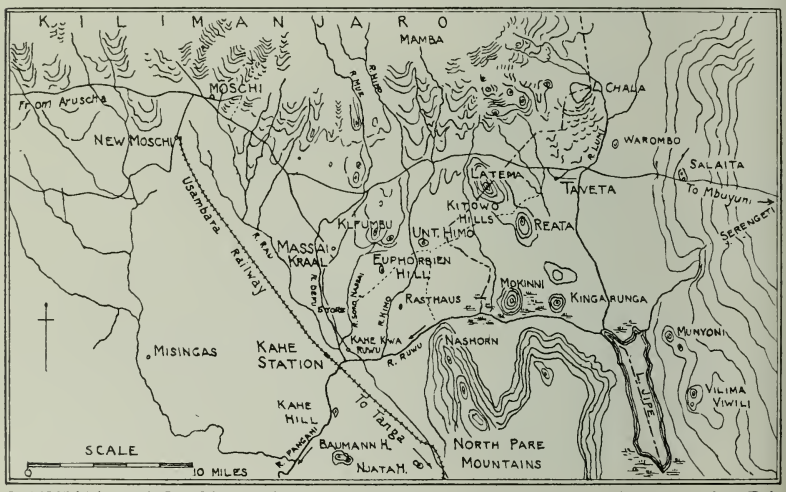
During the attack made by the 2nd Division on the Latema-Reata Nek, two sections of No. 1 Combined Field Ambulance were opened at Taveta, in the house of the Assistant Commissioner, and all casualties were sent there. This house had been used by the Germans as a hospital. They had also constructed a large number of " bandas,"† which provided

* Bridge over the river Himo on the Taveta-Moschi road.

† A " banda " is a grass hut constructed on a skeleton of woodwork. It provided excellent shelter against both rain and sun and was far superior to all but the stoutest of tents.

satisfactory hospital accommodation and were much used throughout the campaign. The casualties were brought from the advanced dressing stations by stretcher-bearers, by motor ambulance and by ordinary motor cars. They were evacuated to railhead by returning empty supply wagons and by two sections of No. 18 M.A.C., which had arrived in time for the action.

The enemy retired to the Ruwu river, a strong natural position protected on the north by a dense tropical forest. From 13th to 18th March the British troops employed the time in improving the roads from Taveta to Moschi, reorganizing transport, advancing the branch railway, bringing up supplies,



SKETCH MAP OF THE MOSCHI - TAVETA - KAHE AREA

and in reconnoitring the area towards Kahe and the Ruwu river. On the 18th a general advance was ordered. On the extreme right a small mounted force advanced by way of Massai Kraal. The 3rd South African Brigade moved from Himo bridge on Euphorbien Hill, and the 2nd South African Brigade from the same point on Unterer Himo, whither two additional battalions had also been sent from Latema. The infantry kept the line between Euphorbien Hill and Unterer Himo without difficulty. The small mounted force on the right encountered three enemy companies at Massai Kraal, and was reinforced on the 19th by the 2nd East African Brigade of the 1st Division from New Moschi. The troops on the Euphorbien Hill–Unterer Himo line made little progress through the well-nigh impenetrable bush. The 3rd South African

Brigade suffered about forty casualties. The mounted force on the right, with the assistance of the brigade from the 1st Division under General Sheppard, drove back the enemy to Store. The following day this force was further reinforced by the 2nd South African Brigade from Unterer Himo, while another small force, under General Van Deventer, left Moschi with instructions to cross the Pangani and gain the rear of the enemy's position at Kahe Station. The British force, while bivouacking at Store, was attacked during the night and lost twenty men. General Van Deventer, after some severe fighting, captured Kahe Hill, and as soon as his force was known to be nearing Kahe General Sheppard's force was ordered to advance. Some severe fighting occurred at Soko Nassai. Unfortunately, General Sheppard received no support from the brigades on his eastern flank. His advance was checked, and the troops dug a position in front of the enemy on the evening of the 21st, having sustained 288 casualties. Van Deventer's force, however, had now reached Kahe Station, and during the night of 21st/22nd the enemy retired.

During the fighting at Soko Nassai the tent sub-division of " D " Section, No. 120 Indian Field Ambulance, was stationed at New Moschi for the reception of the European and Indian sick in that town. The bearer sub-divisions of two sections of the East African Field Ambulance and " B " Section, No. 140 Indian Field Ambulance, collected and cleared casualties from the 2nd East African Brigade, while the bearer sub-divisions of " C " and " E " Sections, No. 139 Indian Field Ambulance, did likewise for the 2nd South African Brigade. Advanced dressing stations were opened about 600 yards behind the firing line, but the sites had to be changed owing to the shell-fire of the enemy. The wounded were conveyed to Store, where a tent sub-division of the East African Field Ambulance, and " B " Section, No. 140 Indian Field Ambulance were opened. Ultimately, all the sick and wounded were evacuated to the tent sub-division at New Moschi by motor ambulance convoy cars or in motor lorries brought up expressly for the purpose. For the casualties from the eastern flank two tent sub-divisions and three bearer sub-divisions of No. 1 Combined Field Ambulance were opened at Unterer Himo. A tent division of No. 4 South African Field Ambulance was opened at Himo and No. 2 South African Field Ambulance at Taveta.

The result of the operations of 18th–21st March was to drive the enemy from the country north of and along the Ruwu river.

Aruscha had been occupied by a small detachment of mounted troops, who drove off the enemy in a southerly direction. Thus the conquest was accomplished of the Kilimanjaro–Meru area, one of the richest and most desirable districts of German East Africa.

The headquarters of the East African Force was then established at Moschi, and a chain of outposts was placed along the line of the Ruwu. Troops were concentrated in the most healthy localities to enable them to recuperate after the hardships they had endured. This was desirable, since shortage of transport had necessitated the force moving on light scale, and for three weeks the majority of the troops had no more than a waterproof sheet and a blanket as a protection against sun, rain and cold. Rations had at times unavoidably run short. Long marches in the hot sun and the occasional drenching rains tried the most hardened campaigner and told heavily on those troops who had been in the field since November 1914. To clear the sick casualties, medical units were opened at Kahe, Moschi, Himo and Taveta. The sick were transferred to Taveta by motor ambulance convoy and evacuated from there to Voi by ambulance train.

Reorganization of the forces was now essential owing to the number of reinforcements which had arrived in the country and their diverse nationalities. By the end of March 1916 the East African Force was organized into three divisions. Two of these consisted of the contingents from the Union of South Africa, and the third included the Indian and British units. The Union divisions were so organized that each contained a mounted and an infantry brigade. It is important to note the names of divisional and brigade commanders, as the columns which were afterwards formed were known by their commander's name.

The 1st Division, under the command of Major-General A. R. Hoskins, consisted of the 1st East African Brigade under Brig.-General S. H. Sheppard, and the 2nd East African Brigade under Brig.-General J. A. Hannyngton. An A.D.M.S. was appointed and the medical units allotted to the division were: "C" and "D" Sections, No. 26 British Field Ambulance; "B," "C" and "D" Sections, No. 120 Indian Field Ambulance; No. 3 Section, East African Field Ambulance; No. 1, Indian Bearer Company, No. 2, Indian Bearer Company less half a section; and No. 1 South African Sanitary Section.

The 2nd Division, under the command of Major-General J. L. Van Deventer, was composed of the 1st South African

Mounted Brigade under Brig.-General Manie Botha, and the 3rd South African Infantry Brigade under Brig.-General C. A. L. Berrangé. An A.D.M.S. was appointed, and the medical units allotted to the division were: No. 1 South African Mounted Brigade Field Ambulance, No. 4 South African Field Ambulance, and half No. 2 South African Sanitary Section.

The 3rd Division, under the command of Major-General Coen Brits, was to consist of the 2nd South African Mounted Brigade under Brig.-General B. Enslin, and the 2nd South African Infantry Brigade under Brig.-General P. S. Beves. The 2nd South African Mounted Brigade, however, did not arrive until May and was not ready to take the field until the end of June. An A.D.M.S. was appointed, and the medical units allotted to the division were: No. 3 South African Mounted Brigade Field Ambulance, No. 2 South African Field Ambulance, a half section of No. 2 Indian Bearer Company, and half No. 2 South African Sanitary Section.

The troops on the lines of communication were under the command of Brig.-General W. F. S. Edwards, Inspector-General of Communications. The medical units on the lines of communication were: No. 3 South African Field Ambulance; "A" and "B" Sections, No. 140 Indian Field Ambulance; "A," "B," "C" and "D" Sections, No. 139 Indian Field Ambulance; No. 2 Section, East African Field Ambulance; No. 18 Motor Ambulance Convoy; "A," "B," "C" and "D" Sections, No. 22 Indian Clearing Hospital; No. 19 British Stationary Hospital; No. 32 British Stationary Hospital, to which was added an improvised section of an Indian Clearing Hospital; one bacteriological laboratory, one hygiene laboratory, No. 9 Indian Sanitary Section, one British sanitary section, one British advanced depôt of medical stores, one South African advanced depôt of medical stores, one base depôt of medical stores, the King's African Rifles' Depôt Hospital, Carrier Corps Hospital; Nos. 1, 2, 3 and 4 Base Hospitals, stationed at Mombasa, Voi, Kajiado and Kisumu respectively; one Combined General Hospital for British and Indians, and No. 2 South African General Hospital.

After the reorganization of the divisions, the infantry units were as far as possible retained on the elevated ground at Moschi, Himo and Mbuyuni, with only advanced guards along the malarial area around the River Ruwu, facing the enemy forces in the Pare mountains. Before any further advance was possible, it was necessary to improve the lines of communication.

The question of transport was the great problem, for when the rains began the roads or tracks would be transformed into quagmires and would no longer be fit for motor transport. It was essential, therefore, to push forward the railway from Voi past Serengeti, and over the River Lumi and the low-lying swampy ground surrounding it.

The East African Force was already in possession of the Usambara Railway from New Moschi to the Pangani. The engineers and additional troops worked night and day on the branch railway which was gradually extended from Serengeti to New Moschi. The road from New Moschi to Aruscha was known to be bad ; there were many streams and river-beds to be crossed and long stretches of swamp that would have to be negotiated by the transport. An alternative route from Longido West to Kilimanjaro had been followed by the 1st Division in their original advance. The rains in that area were known to be slight and it was thought that transport might be moved by this road. At this time the personnel of the force was working at high pressure to bring forward supplies of every kind.

The headquarters of the 1st Division were established at Mbuyuni in a dry and healthy district, while one brigade was stationed at New Moschi and the remainder of the division at Mbuyuni. The headquarters of the 2nd Division were established at Aruscha. The 3rd Division was concentrated around Himo, which was also a healthy and satisfactory site. A small advanced General Headquarters was established at Old Moschi. This staff included a D.A.D.M.S. (Sanitation). New Moschi was the railhead and was made the advanced depôt for motor transport and Royal Engineers.

The scheme for the evacuation of wounded depended entirely on the use of the upper portion of the Usambara Railway and the new branch railway to Voi. It was natural, then, that lines of communication hospitals should be established at Kahe, New Moschi, Taveta and Mbuyuni.

Up to this point the British force had only succeeded in entering the enemy territory, which extended over an enormous area with no obvious vital point. There were no important cities or centres and practically no roads, the dominant features being the two railway systems. The advantages to be gained from the capture of Dar-es-Salaam and an advance inland from that point were considered. The taking of the capital would have been an event of political and military importance and would have facilitated the transport and supply arrangements

for the campaign in the interior, but a prolonged campaign on the coast immediately after the rainy season would undoubtedly have given rise to a very large percentage of invalidism from malaria and other tropical ailments. General Smuts ultimately decided to advance the whole of the 2nd Division into the interior under Van Deventer and to keep his other divisions in comfortable quarters during the rainy season. On the western frontier of German East Africa he set the Belgian and British forces simultaneously in motion in the Ruanda and Bukoba districts respectively. In the Eastern Lake and Uganda area there was a British force of about two thousand rifles, while there was a large Belgian force in the west, in the neighbourhood of Lake Kivu, which could be employed if transport and supply arrangements by the Victoria Nyanza could be successfully organized.

By 1st April the 2nd Division had engaged the enemy six miles north of Lol-Kissale, thirty-five miles south-west of Aruscha, and the fighting continued during the 4th and 5th. The German force surrendered on the 6th, and the 2nd Division was ordered to send mounted troops to occupy Ufiome, Umbulu and Kondoa-Irangi, the remainder of the division to follow in support. Ufiome was occupied on the 13th April and Umbulu on 11th May. On 17th May the enemy was encountered four miles north of Kondoa-Irangi, and fighting continued till noon on the 19th, when the enemy force retired and the 2nd Division occupied the town. The division had advanced altogether some 200 miles from Moschi. By the middle of April the rainy season had commenced, and torrential rain poured down throughout the whole area between Taveta and Kondoa-Irangi. The division was practically cut off, and the troops had to live for weeks on such supplies as could be collected locally or carried by porters from Lol-Kissale, a distance of 130 miles. The strain and privation were reflected in the lowered state of health of the troops. By the middle of May the 2nd Division was concentrated at Kondoa-Irangi, with detachments at Ufiome and Umbulu, and patrols were sent out in the direction of the Central Railway.

The medical units with the 2nd Division during this period had few battle casualties to attend to but many sick. During the greater part of the period few sick could be evacuated as the use of motor ambulance cars was impracticable. Drugs, comforts, rations, tentage, blankets, mattress covers, boots, were short of the force's requirements. Occasionally both telegraphic and postal communication were completely

suspended. As might be expected in such circumstances, the various mobile medical units became immobile and acted as stationary hospitals. Fortunately, two sections of No. 22 Indian Clearing Hospital had been opened at Aruscha. The field ambulances with the division had been divided up into sections. One section of No. 4 South African Field Ambulance was at Aruscha, one section was at Umbulu, while the third was at Kondoa-Irangi. Sections of the other units were distributed at Lol-Kissale and elsewhere. Towards the end of May a section of No. 2 South African Field Ambulance arrived with the reinforcements from another division.

After the occupation of Kondoa-Irangi the Germans counter-attacked, and the 2nd Division lost two officers and four other ranks killed, and one officer and seventeen other ranks wounded. During this action a section of No. 4 South African Field Ambulance and a section of the No. 1 South African Mounted Brigade Field Ambulance, which had been opened in the Catholic Mission for the reception of sick and wounded, were severely shelled and had to remove to a new site.

The actual numbers of sick admitted to hospital during this period are not available, but it is known that at this time the 2nd Division was so reduced by sickness, due to lack of food, that it could hardly count on three thousand rifles. The medical units attached to the division were equipped for only 250 patients, and with efficient evacuation this shortage of equipment would not have been a serious matter ; but in this force, with its limited evacuation arrangements, it was keenly felt. The troops themselves had not sufficient covering, either of tentage or blankets, and in the circumstances further supplies were not obtainable.

Towards the middle of May the rains abated, and the ground became more firm. The G.O.C.-in-C. decided to strike at the enemy forces occupying the Pare and the Usambara mountains, as the Germans had concentrated their forces in front of Kondoa-Irangi. They could, however, move back their troops to Handeni in twelve days and to Korogwe in fourteen days. It was therefore advisable for the British force to reach the Western Usambara mountains and Handeni before the enemy could withdraw his troops from Kondoa-Irangi to oppose this advance. The nature of the country was such as to preclude any rapid movement of troops. The Pare and Usambara mountains consist of high ranges, interspersed with fertile valleys. The western heights are precipitous, and immediately below runs the Tanga Railway ; while farther west dense bush extends for

fifteen to twenty miles to the Pangani, an impassable river flowing almost parallel with the railway and the mountains. The enemy held the mountains and the railway, and his outposts were stationed along the Pangani. The force was believed to be about two thousand strong and armed with field and naval guns.

The British force which was to make the advance was divided up into columns formed from the 1st Division. The advance began on 18th May with the moving of Lieut.-Colonel T. O. Fitzgerald's battalion of the 3rd King's African Rifles from Mbuyuni to the Ngulu Gap. It was accompanied by "C" Section of No. 120 Indian Field Ambulance. On 22nd May Brig.-General Hannyngton's brigade moved from Ruwu along the railway, supported by "B" Section of No. 140 Indian Field Ambulance and "D" Section of No. 120 Indian Field Ambulance. The main body, composed of the brigades under Generals Sheppard and Beves, and accompanied by "A" Section, No. 140 Indian Field Ambulance, "B" Section, No. 120 Indian Field Ambulance, and "C" Section, No. 26, British Field Ambulance, moved down the Pangani river. (See Map facing p. 429.) The G.O.C.-in-C. and Major-General Hoskins accompanied this column.

The first enemy position was attacked on 24th May. On the following day Same station was occupied, and on the 26th Fitzgerald's column joined up with Hannyngton's column and became part of it. This column was ordered to make for the Mkomazi river, by way of Same Pass, and the South Pare mountains. The column reached the Mkomazi bridge on 31st May, and the enemy force retired in the direction of Handeni, on the Central Railway. Meanwhile, the advance of the main column continued steadily along the Pangani. The enemy made a stand at a position situated near where the Pangani rejoins the railway close to the mountains. On 30th May one regiment made a frontal attack, while the remainder of Sheppard's brigade accomplished an arduous but successful turning movement to the left. The enemy retired along the railway during the night, and Buiko was occupied on the 31st. The main column then crossed over to the right bank of the Pangani, and the further clearing of the enemy from the Usambara district was left to Hannyngton. The force halted for a short time at "German Bridge,"* while the engineers repaired the bridge over the Pangani, and the supply and transport service

* Name given to the bridge built by the Germans at Mikocheni.

organized a supply depôt. A distance of 130 miles had thus been covered in ten days, over trackless country, through mountains, and along the Pangani river, where the only signs of life were the spoors of lions, rhinoceros, hippopotami and every kind of antelope and snake.

By 8th June the main column had advanced and there was a brief action with the main force of the enemy at Mkalamo ; but the enemy retired and the advance to Handeni continued. General Sheppard, with two battalions, crossed a dry belt of

A main roadway showing carcase left on roadside.

thirty-two miles, when water was only obtained by digging in a dry river-bed. He encountered the enemy in an entrenched position five miles from Handeni on 15th June. Beves' brigade executed a turning movement and attacked the enemy on the 18th June. On the following day Sheppard occupied Handeni. Kangata, a village noted for ticks and "chiggas" and situated on a bare knoll surrounded by elephant grass, was next occupied, and the main column gained the main road between Handeni and Morogoro, having marched about 200 miles along routes prepared by themselves and generally cut through the bush.

This road soon became foot deep with powdered dust and caused heavy casualties amongst the limited transport vehicles.

This was a noted " fly" belt ; and animal transport could not be used. Supplies ran short and were poor in quality, alike for British, Indians and Africans.

Meanwhile General Hannyngton's force had occupied Mombo on 9th June, the enemy retiring south along the railway. On the 12th this force occupied Wilhelmstal, a favourite health resort and commonly called the Simla of East Africa. It is situated 5,000 ft. above the sea and the climate is cool and healthy. Cattle flourish there as it is above " fly " level. The town was connected by excellent motor roads with Mombo, and it had a good hotel and well-built houses. Korogwe was occupied on 15th June, and Hannyngton was then instructed to proceed along the Korogwe–Handeni road in order to rejoin the main body of troops which was then approaching Handeni. This town was a German plantation centre, with good roads to the east and a good water supply. It was occupied on 19th June.

The enemy now retired to a strong position on the Lukigura river, and a force under General Hoskins proceeded to a point on the river north of the bridge held by the enemy. On 24th June this force crossed the river and took up a position astride the road in rear of the enemy. The remainder of the 1st Division, under General Sheppard, advanced direct on the enemy's position. The enemy after a sharp action managed to retire, and concentrated his force in the Nguru mountains. Before any further movement could take place against the enemy's main forces on the Central Railway the 2nd Division had to advance beyond Kondoa-Irangi. In the meantime the transport of the 1st Division had to be overhauled, the supply depôts restocked, as the force had out-marched its supplies, and the lines of communication improved. The troops required food, rest and reinforcement, as many units were now reduced to 30 per cent. of their original strength owing to ravages of malaria.* A large entrenched camp, known as Msiha Camp, was formed on the Msiha river, eight miles beyond the Lukigura

---

* Mosquito nets had been issued but they were hopelessly small and unsuitable. Some troops used them for carrying rations. A good deal of malaria was undoubtedly due to carelessness and lack of training. Regimental officers and men had not been trained even in the elements of sanitation, and the staffs of the smaller formations were equally ignorant of the subject. Shorts were being worn although the medical authorities had drawn attention to this. They could not, in any case, have been changed at that time as there were no clothing reserves in the country.

river, and here the troops of the 1st and 3rd Divisions were rested and re-equipped prior to further operations.

During the advance down the Pangani river to the Nguru mountains there had been little fighting and consequently few wounded to evacuate. The whole question resolved itself into the evacuation of the sick, and the difficulties of evacuating sick were as great as those of forwarding supplies. As has been stated, the main centres of evacuation at the commencement of the advance were the small towns located at the head of the Tanga–Moschi railway and the new branch railway from Voi constructed by the British force. At Mbuyuni No. 15 Stationary Hospital had been opened. This unit was complete and well organized, and an improvised section for the treatment of Indian and African troops had been attached to it. At Taveta, " D " Section, No. 139 Indian Field Ambulance, was established, and had been supplied with extra tents, stretchers, blankets and other equipment, and additional staff was attached. A spare ambulance coach and kitchen were garaged here for use on the Taveta–Kahe line, and staffed by personnel from Moschi. At Himo, where the River Himo crosses the Taveta–Moschi road, No. 32 British Stationary Hospital and No. 3 Mounted Brigade Field Ambulance were opened out. At New Moschi No. 19 British Stationary Hospital was established with half No. 52 C.C.S. in reserve, and No. 2 Section, East African Field Ambulance, was opened for the reception of Indian sick. The South African Advanced Depôt of Medical Stores, with a field depôt of medical stores, and an improvised carrier depôt and hospital, had also been stationed here. At Voi there were the Voi Base Hospital and No. 1 Section, South African General Hospital. Improvised ambulance trains arrived there from Taveta and the one ambulance train ran to Nairobi. At Kahe half No. 52 C.C.S. and " B " and " D " Sections, No. 22 Indian Clearing Hospital, were receiving sick. At this town the motor ambulance convoy, engaged in clearing the casualties from formations advancing along the Pangani river, had its headquarters. The casualty clearing stations had been instructed to evacuate European sick to Moschi and natives to Taveta by motor trolley and car. The sick admitted to medical units during the advance along the Pare and Usambara mountains were collected at certain points and sent back either by motor ambulance cars or supply lorries. Medical officers, with some personnel and comforts supplied by the field medical units, remained in charge of the sick and conducted them back to the casualty clearing stations.

As the advance developed, No. 52 C.C.S. was ordered to proceed to Same and No. 32 British Stationary Hospital to Taveta, as soon as Himo had been evacuated by the units of the 3rd Division. About the middle of June No. 52 C.C.S. and two sections of No. 22 Indian Clearing Hospital, which had reached German Bridge, were ordered to Handeni and Korogwe, as serious cases could not be moved back from there owing to the bad roads; the sick at Handeni were being looked after by divisional units. No. 32 British Stationary Hospital was also moved forward, as it was decided to evacuate all sick to Mombo, where they would be retained. The strain on the motor ambulance convoy was so great that the D.M.S. telegraphed for another convoy to be sent from Egypt, together with twenty cars to replace those which had broken down. Eventually No. 32 British Stationary Hospital and the line of communication hospitals were concentrated at Handeni, and a field depôt of medical stores was opened there. The moving of the clearing hospitals was a problem as these units were without transport. This was eventually obtained, but only with difficulty. On the 26th June the I.G.C. authorized two lorries, with a total lifting capacity of 5,000 lb., to move No. 52 C.C.S. and No. 22 Indian Clearing Hospital, and two more lorries were reserved in a subsequent convoy for carrying forward extra equipment.

These arrangements for the evacuation of sick and wounded from an advanced position are somewhat typical of the early days of the campaign in Mesopotamia and unlike the organization on the Western front. The staff at General Headquarters did not apparently realize that a scheme for the proper evacuation of casualities should have been made an important part of their duties. In this case the D.M.S. of the force was stationed at Nairobi, being represented on the staff of the G.O.C.-in-C. at advanced headquarters by a D.A.D.M.S. (Sanitation). The D.D.M.S., L. of C., whose office was also at Nairobi, was constantly on the move, and in May 1916 he arranged for the appointment of an A.D.M S., Eastern L. of C., to supervise the medical arrangements during the advance down the Pare and Usambara mountains. During these operations there was no system in the evacuation of casualties. The responsible medical officers could not always keep in touch with one another, with the result that there was an apparent lack of co-ordination and smoothness in the system of evacuation of sick and wounded.

Msiha Camp, in which the troops were forced to halt, became a network of trenches and dugouts, as it was subjected to a continuous bombardment, causing approximately one hundred casualties amongst the troops and personnel of the medical units. While the line of communication from Moschi was being improved steps were taken to seize Tanga. The port was occupied on 7th July practically without opposition, as the result of a small combined operation between troops detailed from General Smuts' force and by the Inspector-General of Communications, in co-operation with the Navy. A small enemy force, consisting of a few companies, remained in the neighbourhood and carried on a guerilla warfare. Minor operations were conducted against this band of marauders and they retired in a southerly direction. They were overtaken, however, and defeated at Manga. Sadani Bay was occupied by the Navy on 1st August, farther south the Lower Wami river was cleared, and Bagamoyo on the coast was taken over by the Navy on 15th August.

While the 1st, 2nd and 3rd Divisions were engaged in the Kilimanjaro, Kondoa-Irangi and Usambara areas and advancing towards the Central Railway, the "Lake Detachment," consisting of the 98th Infantry, the 4th Battalion King's African Rifles, Nandi Scouts and other small irregular units, had been operating in the region of Victoria Nyanza. During April, May and June 1916, the troops of the Lake Detachment on the western side of Victoria Nyanza gradually forced the Germans' defence posts on the Kagera river, south of the Uganda Protectorate, and on 9th June the large island of Ukerewe was captured.

Along the Congo frontier there had been intermittent fighting between the Belgians and the Germans since the outbreak of war, both on the plains north of Lake Tanganyika and on the northern slopes overlooking Lake Kivu. It was decided to bring the Belgian forces and the Lake Detachment into closer co-operation and to institute an advance towards Tabora. In view of the advance, Brig.-General Sir Charles Crewe, a member of General Smuts' staff, was appointed to the Lake Command in the middle of June 1916. These forces were operating over many hundreds of miles of difficult country. The British columns were supported by improvised sections of a field ambulance and clearing station, sick and wounded being evacuated by porters or in rough bullock tongas. As a result of the operations the Lake detachments were in urgent need of more medical personnel, medical units and a better form of transport.

The Belgians lacked transport, supply and medical arrangements, and General Crewe promised that the Uganda Force would supply them with the necessary medical equipment and units. This was done, however, without consulting the D.M.S., who at that time had no reserves of field units and indeed not even sufficient for the divisions already operating in the direction of the Central Railway. The organization of the transport, supply and medical arrangements for the Belgian force was consequently a matter of considerable difficulty, and it cannot be said that the arrangements were efficient; but it was given as much assistance as was possible and the forces were able to advance. The advance of the Belgian force towards Lake Victoria Nyanza gave General Crewe the opportunity to concentrate his forces, and caused the enemy to evacuate the town of Mwanza on 14th July.

The military position in German East Africa at the beginning of July 1916 may be summed up as follows: There were six forces operating against the Central Railway on its northern side. The first from Msiha Camp was under the personal leadership of General Smuts, and its objectives were Kilossa and Morogoro. The second, under Van Deventer, was operating from Kondoa-Irangi in the eastern area of the railway and aimed at Dodoma. The third, under Crewe, with Belgian support, from Mwanza and south of Victoria Nyanza, was directed against Tabora. The fourth, from Lake Tanganyika, was entirely Belgian, and directed against the western terminus of the Central Railway. A fifth force was advancing along the sea-coast in conjunction with the Navy, the objective being Dar-es-Salaam, the eastern terminus of the Central Railway; and there was a sixth force, formed of irregular troops, which had concentrated at various points along the northern borders of Rhodesia and Nyasaland. This force, under the command of Brig.-General E. Northey, had occupied New and Old Langenburg in the neighbourhood of Lake Nyasa and Bismarckburg on Lake Tanganyika early in June. By 30th June Northey had driven the enemy out of Ubena, and in July he was advancing towards Iringa. To complete the list of operations it should be mentioned that, when Portugal threw in her lot with the Allies in 1916, the Portuguese attacked the Germans on the southern frontier of the colony.

The main fighting was carried out by the 2nd Division under Deventer and the 1st and 3rd Divisions under Smuts. The difficulties of evacuating casualties from Van Deventer's force have already been described, and it was shown how the field

ambulance sections had all been converted into improvised stationary hospitals, the roads being unfit for motor transport. To ease the congestion on this line, another casualty clearing station had been moved to Kondoa-Irangi and extra motor ambulances and an advanced depôt of medical stores had been stationed as far forward as possible.

The reorganization for the evacuation of casualties from the 1st and 3rd Divisions was more elaborate. The Moschi–Tanga railway ran through Korogwe, and this town was made the railhead. Handeni was connected with the railway by a railway trolley line running from Mombo via Mkalamo; from Handeni all supplies had to be conveyed to Msiha Camp by road transport. The casualty clearing stations had now been provided with independent transport, but this transport was apparently a source of disagreement between the I.G.C. and the D.M.S. The former wanted to use it for conveying general supplies, but the D.M.S., having suffered in the past from lack of transport, preferred to employ it purely for transporting medical equipment to Msiha Camp. Extra medical units, namely, No. 19 Stationary Hospital, No. 2 East African Field Ambulance and the South African Advanced Depôt of Medical Stores, were brought up to Korogwe. There was a small German sanatorium, twelve miles distant, but this was employed as a maternity hospital. No. 19 Stationary Hospital was opened in the German hospital on the University Mission site, on the foothills of the Usambara mountains. A considerable amount of work was necessary before this site could be cleared of jungle and made ready to accommodate 500 cases in tents and bandas. No. 52 C.C.S. and sections of No. 22 Indian Clearing Hospital had been opened at Handeni and provided accommodation for 500 British and 500 natives respectively. These units also formed a convalescent depôt for 250 British and 250 natives, and they were instructed to evacuate to Korogwe only patients who were not likely to recover. At Mbuyuni sections of the South African General Hospital, which had been transferred from other situations, were formed into a combined general hospital to accommodate between 753 and 1,000 cases. No. 15 Stationary Hospital organized a convalescent camp there for 500 cases and a detail camp to accommodate 100. The A.Ds.M.S. of the 1st and 3rd Divisions were informed that mobile sections of the casualty clearing stations, known as "rest sections," would advance and take over the casualties at the divisional collecting stations whenever called upon to do so.

SKETCH MAP SHOWING THE ROUTES USED FOR EVACUATING SICK AND WOUNDED AT THE END OF SEPTEMBER, 1916

Van Deventer's force was the first to move against the Central Railway; he had received orders to clear the right flank towards Ssingida, to move a small column along the Saranda

road towards Kilimatinde, and to direct his main force towards Dodoma and east to Mpapua, with the object of occupying the Central Railway and getting into closer co-operation with the force at Msiha. There was a small action in the bush at Mpondi, the casualties being eight killed and nine wounded. Saranda and Kilimatinde, on the Central Railway, were occupied on 31st July. The main force reached Aneti on 19th July, where it was divided up into two columns. One of these columns occupied Dodoma on 29th July, having had a slight encounter with the enemy on the way ; the other fought a sharp engagement at Tissa-Kwa-Meda on the 22nd and

View of country in the neighbourhood of Gulwe Lake near the Central Railway, East Africa.

another at Njangalo, and reached Kikombo on 30th July. By the end of July 100 miles of the Central Railway were in the possession of Van Deventer's force. He concentrated the bulk of his troops at Njangalo on the main road to Mpapua. The force was now 300 miles from the railhead at Moschi, so that the question of transport, supplies and the evacuation of casualties had to be seriously reconsidered. The troops suffered little from sickness during this advance, as a careful medical examination had been held before leaving Kondoa-Irangi, and all those considered unlikely to stand the hardships of the active operations and the long marches were left behind. The casualties, too, had been slight.

Sections of the various field ambulances were opened as the advance proceeded. When these became filled with casualties

they had to remain behind until cleared by motor vehicles, or if this were not possible a temporary post hospital was formed. Transport for the evacuation of cases was always inadequate, and this was frequently represented to General Headquarters. The force was not well supplied with medical comforts, and the sanitary equipment was so deficient that there was not even a water-testing cabinet with the division.

By the end of July the field ambulance sections were distributed as follows: "A" Section, No. 4 South African Field Ambulance, en route for Dodoma; "B" Section, No. 4 South African Field Ambulance, near Saranda; "C" Section, No. 4 South African Field Ambulance, en route for Njangalo; "A" Section, No. 3 South African Field Ambulance, en route for Njangalo; "C" Section, No. 3 South African Field Ambulance, en route for Dodoma; "A" Section, No. 2 South African Field Ambulance, en route for Ssingida; "A" Section, No. 1 Mounted Brigade Field Ambulance, at Membe; "B" Section, No. 1 Mounted Brigade Field Ambulance, en route for Naju. There was, in addition, a relief post at Cypherkurt, another at Aneti, and a third at Tissa-Kwa-Meda.

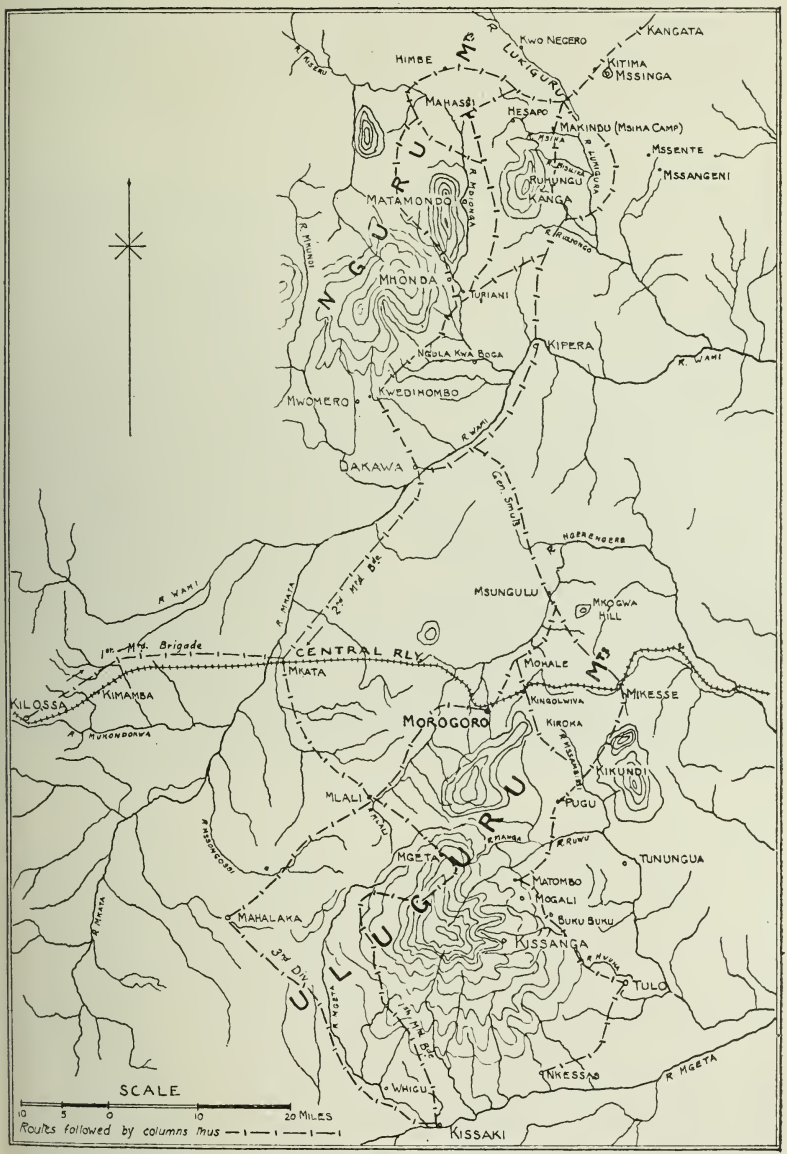
Van Deventer began his advance to Kilossa and the Great Ruaha river on 9th August, and on the 11th got into touch with the enemy at Tschunjo just north of Mpapua. On 15th August the enemy forces were engaged at Kidete, from which they were driven late in the afternoon of the following day. During the advance Van Deventer's force lost six killed and thirty-nine wounded. At Mpapua "A" Section, No. 3 South African Field Ambulance, was opened in the German Veterinary Institute; and at Kidete a temporary hospital was formed in the railway buildings. From 15th to 22nd August the troops were in daily contact with the enemy, and gradually drove him from Kidete along the railway line towards Kilossa and Kimamba, which were occupied on the 22nd. Despite the fact that the troops had covered at least 220 miles since leaving Kondoa-Irangi, on bad roads and with inadequate transport and rations, they were now ordered to advance on Kidodi and Kidatu. The line of advance was over high mountain ridges against entrenched troops, and the operations entailed much arduous mountain climbing and constant fighting. The casualties, however, were few, as the operations consisted mainly of flanking movements, with the enemy retreating under cover of darkness. When Kilossa was entered, an improvised hospital was established at the railway station, and during the advance from there to Kidodi

improvised sections were opened whenever necessary, cases being evacuated to Dodoma, where a casualty clearing station had been opened. During this period of the advance the sick-rate increased, and a large percentage of the force suffered from malaria and diarrhœa. The shortage of motor ambulance transport, drugs and medical comforts was still acute. The sick-rate continued to increase, and the A.D.M.S. submitted to the G.O.C. of the division a report on the health of the troops. The report stated that the majority of the fighting troops were in need of rest and change to a more salubrious climate, being debilitated by continuous marching, road-making, drift making, fighting and lack of food, and by malaria and dysentery.

Bandas of convalescent section of a casualty clearing station, Dodoma.

The tasks of the 1st and 3rd Divisions under General Smuts were equally formidable, owing to the character of the terrain. The main road to the Central Railway ran for about forty-five miles close to the Nguru mountains and Mount Kanga. In the mountains and across this road lay an enemy force of about 3,000 rifles, armed with both light and heavy guns. It was decided to clear the enemy by wide turning movements through the mountains. General Sheppard, with the 1st East African Brigade, was to make a feint from Msiha, directly against the German position at Ruhungu, on the main road, while in reality he was moving the bulk of his men on the left in order to gain the Russongo river, six miles in rear of Ruhungu. General Hannyngton, with the 2nd East African Brigade, was to march to Mahassi and from there, with the assistance of

General Hoskins' force, was to drive the Germans along the valley of the Mdjonga ; while the 3rd Division, under General Brits, would at the same time make a detour in a north-westerly and then in a westerly direction through the Mhonda Gap, in



SKETCH MAP OF THE NGURU AND ULUGURU AREAS

rear of the enemy forces posted on the slopes of Mount Kanga and in the Mdjonga valley. The 2nd South African Mounted Brigade of the 3rd Division occupied Mhonda on 8th August. General Hannyngton's brigade encountered the enemy at Matamondo on the 9th. General Sheppard's brigade progressed slowly through dense bush and gained the Russongo on 11th August. The 2nd South African Brigade, under Beves, had to be diverted to Matamondo to assist Hannyngton, whose force was heavily engaged. The 3rd Division troops

View of the Ruwu River.

were able to hold Mhonda, and thus force the enemy to abandon his defence of the mountains and retire with all speed. By the 15th some 3rd Division troops under Enslin and the brigade under Hannyngton had reached Kwedihombo and Mwomero, where the roads leading to Morogoro and Kilossa respectively branch off from the Nguru mountains. They met with little opposition. The main body of the enemy retired along the road to Morogoro, while a detachment consisting of a few companies retreated towards Kilossa. The pursuit was continued, and Sheppard's and Enslin's forces arrived on opposite banks of the Wami river at Dakawa on the 16th.

Enslin's force succeeded in crossing the river higher up and the enemy retreated. The Dakawa crossing was occupied on the 18th, and a small force consisting of the Cape Corps pursued the enemy to Kilossa. In these operations the British lost about 120 men.

Morogoro became the next objective as the main force of the enemy had retired in that direction. Enslin, with his brigade, proceeded round the west of the Uluguru mountains and successfully occupied Mlali on 24th August. He was reinforced by the 1st Mounted Infantry Brigade from Van Deventer's division at Kilossa. Another force, under General Smuts, marched round the eastern slopes of the Uluguru mountains from Dakawa with the intention of enclosing the enemy in Morogoro. This force crossed the Wami, and proceeded down the right bank of the river for about nine miles, and then turned east, crossing a waterless and fly-infested belt of about twenty-five miles to the Ngerengere river, north-east of Morogoro. This proved to be one of the most trying marches of the campaign. From 24th August the force was encamped on the right bank of the river. On the 26th General Hannyngton was directed to proceed to Mikesse station, while brigades under Sheppard and Beves moved towards Morogoro. Both these places were occupied the same day, and as there were proofs of precipitate flight and demoralization on the part of the enemy the pursuit was continued, in spite of the fact that the forces were worn out with the exertions of the previous three weeks.* General Sheppard occupied Kiroka, and General Hannyngton was ordered to continue the advance southwards in pursuit of the retreating enemy. By 30th August the enemy forces had been pressed over the River Ruwu.

The above outline of the operations shows that they were complicated. Under the circumstances it is reasonable to presume that a detailed system of evacuation had been planned, and an outline of the medical strategy necessary for the proper functioning of the medical service drawn up. There is no evidence, however, that any well-considered scheme was evolved or that medical units were instructed regarding the part they would play during the operations. The medical arrangements appear to have been haphazard, and sections of field ambulances were apparently attached to any formation that happened to be at hand.

When Hannyngton's brigade encountered the enemy at Matamondo, the difficulties in evacuating casualties must have

* The force had again outstripped its available transport.

been very great, as the sick and wounded had to be evacuated via Mahassi by stretcher-bearers, eight to a stretcher. At Mhonda the sick and wounded were accommodated in the mission buildings, which were suitable for the reception of 200 cases. It was decided to convert these buildings into a permanent rest station for troops during any further advance, but this scheme had to be abandoned because the situation was inaccessible. There were no roads, and casualties had to be man-handled to and from the hospital.

As the advance developed Turiani became the chief evacuating centre. Sections of various field ambulances were retained there to accommodate the increasing number of sick and wounded that were arriving. After the engagement at Dakawa, the majority of cases were transferred to Kwedihombo, where the serious cases were retained until medical personnel and equipment could be sent to treat them. From there the cases were evacuated to Turiani, the slight cases in supply lorries and the more serious in motor ambulance cars. The evacuation, however, had not been organized to the best advantage, as there was a delay of two and a half hours in removing the cases from the supply lorries when they arrived in Turiani. This lack of organization was also in evidence during General Smuts' advance to the River Ngerengere, preparatory to the occupation of Morogoro. The supply lorries were urgently required for bringing forward rations, and could not be delayed for the evacuation of sick. After Sheppard's brigade occupied Morogoro and the enemy retreated beyond the River Ruwu, the 1st Division made a further advance of thirty-three miles with only five sections of a field ambulance for the whole division. The casualties during this advance were not excessive, but the number of sick was steadily increasing, and at that time cases of smallpox and other infectious diseases, as well as serious cases such as black-water fever, were being admitted.

The struggle for the Uluguru range of mountains which commenced after the capture of Morogoro was one of the hardest in the campaign. Brits' 3rd Division, with Enslin's Mounted Brigade, moved along the western side of the mountains, while the 1st Division, under Hoskins, negotiated the eastern flank. (See Map p. 451.) The country was wild, and the road passed over broken foothills covered with bush or grass from 6 to 12 ft. high. Progress was slow and tiring. The bridging of the River Ruwu occupied several days, and for some distance beyond the river the road was a mere track

which the enemy had constructed round the face of precipitous rocks. As this track would not support the mechanical transport of the British force, some days were spent by Sheppard's brigade in blasting away the rocks and constructing a zigzag road. The drop down the escarpment to the Tulo area and the Rufiji plain was 2,000 ft. at this point.

The 1st Division reached Tulo on 10th September, and Hannyngton's brigade drove the enemy south to the Mgeta river on the 13th. The 3rd Division and the Mounted Brigade followed the elephant track through Mahalaka, and it was

German rifle pit, Mahiwa, showing dense character of surrounding bush.

decided that Beves' Infantry Brigade, Enslin's Mounted Brigade and Nussey's Mounted Brigade should co-operate in an attack on Kissaki on 5th September. However, as Nussey's brigade was late in arriving, the other two brigades carried out the attack, but without success, and then withdrew to a point six miles north of Kissaki. Their losses were approximately nine men killed, twelve wounded and seven taken prisoners. Nussey's brigade attacked Kissaki unsupported the following morning, with a loss of twenty-three killed and twenty-five wounded, and then withdrew on receiving orders from General Brits to join the other brigades.

Further operations by the brigades under the command of Hannyngton and Enslin compelled the Germans to evacuate Kissaki. They abandoned their hospital, which was full of sick and wounded, and retired to a defensive line along the Mgeta river. The British force did not continue the attack against this extended line, being exhausted by the ceaseless fighting and long marches of the previous weeks. Furthermore, the transport with the force was not sufficient, and the troops had been receiving half rations or even less, so that they were now badly in need of a period of rest.

Hospital at Morogoro.

The want of a prepared scheme of medical arrangements was again felt in the operations which resulted in the retreat of the German force across the River Ruwu. Before the advance commenced there were only two field ambulances in Morogoro, one attending to the sick of the 2nd Division and the other to the sick of the 1st Division. In charge of the German sick and wounded left behind in Morogoro there were sufficient German medical officers and men, as well as a number of German ladies, to carry out the nursing duties required. Some of the ladies continued to nurse in the hospitals after their own countrymen had been evacuated. When Morogoro became organized, the secretariat and some other buildings were handed over to the medical service and were used as hospitals. The town is only 1,600 ft. above sea-level. It had a fairly large population which had to be fed. The rainfall here was heavy, and lasted from the beginning of December

to the beginning of May, and during this period the place was very unhealthy. Animals could not be kept in the town on account of the prevalence of flies, and cattle had to be kept beyond the fly area in places 3,000 ft. above the town. Eventually markets were opened here, and the native population was encouraged to bring in their produce.

As the advance continued the five field ambulance sections originally with the 1st Division were reduced to four, and the A.D.M.S. sent an urgent request to medical headquarters for some lines of communication medical units to relieve the divisional field ambulances as these were unable to cope with the many casualties. Furthermore, the bad roads and heavy rains interfered with the evacuation of wounded from the front line and delayed evacuation on the main lines of communication route from Handeni to Korogwe. At Turiani, too, there was some delay. The bridge had broken down, and motor ambulance cars could not leave the town to clear the casualties from the field ambulances. During these operations it became evident that both mechanical and animal-driven transport would have to be dispensed with and the patients carried by porters. Large numbers of porters were engaged and employed solely for this purpose. There was, however, a shortage of hammocks for carrying the sick, and, further, sufficient medical personnel and equipment could not be spared for treating porters who fell sick.

During the month of September 1,362 sick and 193 wounded were admitted to hospital from the 1st Division, and of these 1,224 cases had to be evacuated. The strength of the division, including locally engaged porters, was 10,598. At the conclusion of the operations the health of the troops was unsatisfactory. An examination showed that 17 per cent. were suffering from enlarged spleen and anæmia, and in addition 30 per cent. were unfit for hard work on account of debility caused by the recent exertions and underfeeding. The men's clothing was torn to ribbons, and their mosquito nets had long been discarded. In these circumstances, and on account of the near approach of the rainy season, the G.O.C.-in-C. decided to give his troops the required rest.

Meanwhile efforts were made to advance the lines of communication medical units and to obtain extra motor cars. It would appear that by 8th September the distribution of medical units in the northernmost part of the lines of communication was as follows :—

Morogoro.—No. 52 C.C.S., less one section and rest station; "B" Section, No. 22 Indian Clearing Hospital; No. 32 British Stationary Hospital; No. 3 Mounted Brigade Field Ambulance, and No. 29 British Stationary Hospital.

Turiani.—"B" Section, No. 3 Mounted Brigade Field Ambulance.

Lukigura.—Rest Station, No. 52 C.C.S.

Handeni.—A section of No. 52 C.C.S.; "D" Section, No. 22 Indian Clearing Hospital; a field depôt of medical stores, a convalescent depôt, a small dental department, and No. 18 M.A.C.

Korogwe.—No. 19 British Stationary Hospital; No. 2 East African Field Ambulance. An additional motor ambulance convoy, No. 29 M.A.C., was engaged in clearing casualties from the front area, and No. 18 M.A.C. was evacuating cases on the lines of communication.

The routes used for evacuating sick and wounded from south of the Central Railway at the end of September 1916 are shown in the sketch map on p. 447.

The lack of co-operation between the medical and combatant staffs was again responsible for increasing the difficulties associated with the evacuation of casualties in East Africa. It is illustrated by the fact that during September the medical authorities, on the advice of the General Staff, issued stringent orders that all light cases should be retained by medical units near the front and that only those cases unlikely to recover were to be evacuated down the line. They were doing their utmost to accomplish this when an urgent order was received that all hospitals must be cleared as 700 casualties were anticipated. It is obvious that if the medical authorities have received instructions to evacuate casualties according to a definite plan and if, as in this case, the orders are suddenly reversed, then the medical service cannot be altogether blamed for the unsatisfactory state of affairs that may arise.

On 25th September 1916 the Commander-in-Chief suddenly decided to transfer to a healthier climate the Europeans amongst the troops who were suffering from debility or malaria and who had been frequently in hospital. According to the official despatches 12,000 were sent out of the country. When orders are thus issued for the immediate evacuation of large bodies of men not confined to hospital the scheme must be carefully considered. The arrangements for this at

first were not satisfactory, but eventually the Quarter-master-General's Branch at General Headquarters, in consultation with the medical branch, determined the route of evacuation and organized transport and rest camps along the route.

While the operations were being conducted in the Uluguru mountains, minor operations were undertaken in the coastal areas. The I.G.C. assembled a force of 1,800 rifles at Bagamoyo, a small station occupied by the Navy on 15th August. The force was divided up into two columns. The smaller of these

Hospital in Dodoma, showing windows protected from the sun.

marched south to the Central Railway with the object of seizing the Ruwu bridge before it could be destroyed by the enemy, after which the column was to swing round and march on Dar-es-Salaam. The larger column was to proceed along the coast to Dar-es-Salaam. Neither of these detachments met with any serious opposition. The Ruwu bridge, however, had already been destroyed. The coastal column took possession of the small river which flows around Dar-es-Salaam on the west and north, and Dar-es-Salaam surrendered on 3rd September when the fleet appeared. The enemy forces had retired a few days previously after destroying the railway

station and harbour works. After the occupation of this important port, the naval forces were ordered to seize all other important points on the coast to the south, and Mikindani, Sudi Bay, Lindi, Kilwa Kissiwani, Kilwa Kivinje (commonly called Kilwa) and Kiswere were occupied before the end of September. At Kilwa a column was landed for operations inland.

With a view to future operations it was necessary to restore the harbour at Dar-es-Salaam, to prepare a base at Kilwa, and to restore the Central Railway, which had been damaged at certain points by the retreating enemy. As materials were not available for the repair of the railway an improvised

Bridge over the Ruaha River.

scheme was adopted. Bridges were repaired with local material and were made capable of supporting a weight of six tons. The heavy motor lorries were altered to run on railway trolley wheels over the line that was temporarily restored. A motor tractor with trailer attached could thus carry ten to fifteen tons of supplies. From 6th October the railway track was open for traffic between Dar-es-Salaam and Dodoma, a distance of almost 300 miles. In this way Dar-es-Salaam became the chief sea base for supplying the forces with equipment and for evacuating the sick and wounded.

While the main forces were thus advancing, the minor forces, such as Northey's in the west and the Belgians and Crewe's

force in the north-west, and also the other Belgian force and the Portuguese in the extreme south, had also been actively engaged. By the end of October, as the result of the various operations, the German forces had been driven south over the Central Railway, and, with the exception of the Mahenge plateau, they had lost every healthy or valuable part of their colony. In the east they were cut off from the coast, and in the south the Portuguese had advanced north of the Rovuma river.

The wastage from disease and the loss of animals during the British advance to the areas of the Rufiji and Great Ruaha rivers, through numerous tsetse-infested belts of country, made

Building used by No. 2 Indian Combined Stationary Hospital, Iringa.

reorganization of the force imperative. The 3rd Division, under General Brits, and the 2nd African Mounted Brigade, under General Enslin, were disbanded, and the entire personnel sent back to South Africa to recuperate. The force was then organized into two divisions, the first under Major-General Hoskins and the second under Major-General Van Deventer, while an infantry brigade under Brig.-General Beves was in reserve. These divisions were reinforced by the new King's African Rifles battalions and by a Nigerian brigade, under Brig.-General F. H. B. Cunliffe, which, however, did not leave Dar-es-Salaam until December 1916.

The troops in the Kilwa area carried out a few minor operations during October. A small force was stationed forty-five

miles south-west of Dar-es-Salaam, to protect the railway from marauding bands. The 1st Division occupied Tulo, Dunthumi, Kwa-Hongo, Dakawa and Kissaki on the Mgeta river.

In the west there were advanced troops of the 2nd Division at Iringa, at Njukwa's Drift on the Ruaha river and at Kidodi. The remainder were concentrated on the Central Railway. An A.D.M.S., Western L. of C., had been appointed to co-ordinate the evacuation of casualties from medical units in this area. Northey's force was operating in the Iringa area. The Lake force had been disbanded, some of the units being attached to the 2nd Division, while one battalion occupied a portion of the Central Railway east of Tabora. Tabora itself was occupied by the Belgians.

Officers' hospital, Iringa.

The 1st Division took over the Kilwa area on 15th November and was concentrated there by the 29th. It was composed of the troops originally landed in Kilwa, now formed into the 3rd East African Brigade, and a brigade under Brig.-General O'Grady transferred from the Mgeta front. Operations in the Kilwa area were interrupted during December by the violent rains. From 6th to 15th December the enemy attacked some of the Kilwa detachments, and the British force suffered considerable casualties. The 1st Division at Kilwa was ordered to hold some battalions in readiness to move north-west, as a combined plan of operations on the Mgeta front was contemplated.

During November and December Van Deventer's and Northey's forces conducted minor operations in the Iringa–Mahenge area. Meanwhile, Van Deventer on 19th December reported that he had been unable to build up an adequate reserve of supplies, and that consequently he would be unable to feed his troops during the anticipated forward movement. It was decided to move a considerable portion of the forces under his command back to the railway and to retain a small force of three infantry battalions and a squadron of mounted troops at Iringa to take part in the advance. About this time, too, there was considerable activity on the part of the enemy at Mssanga, in the Dar-es-Salaam area.

On the reorganization of the force and the retreat of the enemy to the Mahenge district, a rearrangement of the medical units with the divisions and on the lines of communication became necessary. With the exception of the hospital at Tanga, the base and general hospitals had all been stationed on the Mombasa–Nairobi Railway and on the branch line from Voi to Moschi. Most of these units had now to be transferred to the neighbourhood of the new bases along the Central Railway.

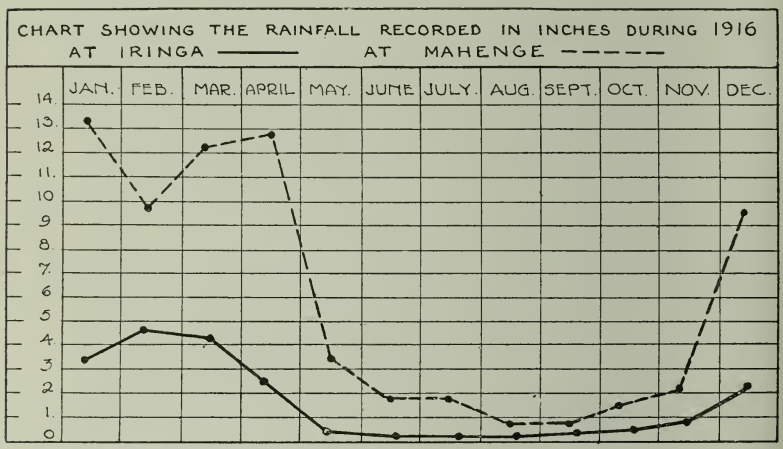
The field medical units were reorganized, and to the 1st East African Division were allotted the following: No. 1 Combined Field Ambulance, composed of "C" Section No. 26 British Field Ambulance, "B" Section No. 120 Indian Field Ambulance, "C" Section No. 120 Indian Field Ambulance, and "A" Section No. 140 Indian Field Ambulance; No. 2 Combined Field Ambulance, composed of "D" Section No. 26 British Field Ambulance, "D" Section No. 120 Indian Field Ambulance (less bearer sub-division), "B" Section No. 140 Indian Field Ambulance, and No. 3 Section East African Field Ambulance; half No. 2 Indian Bearer Company.

To the 2nd East African Division were allotted: No. 1 South African Mounted Brigade Field Ambulance, No. 3 South African Field Ambulance, No. 4 South African Field Ambulance, No. 1 Indian Bearer Company and half No. 2 South African Sanitary Section, with "A" Section Uganda Field Ambulance, and No. 1 Section East African Field Ambulance, for divisional troops.

To the Force Reserve were allotted: No. 2 South African Field Ambulance, half No. 2 South African Sanitary Section and half No. 2 Indian Bearer Company.

To the Kilwa Column were allotted: "A" Section No. 22 Indian Clearing Hospital, "D" Section No. 120 Indian Field Ambulance (bearer sub-division), and "A" and "D" Sections No. 139 Indian Field Ambulance.

To the Lines of Communication the following units were added: No. 3 South African Mounted Brigade Field Ambulance (clearing station to support 1st Mounted Brigade), No. 14 C.C.S., No. 19 M.A.C., No. 29 M.A.C., No. 15 British Stationary Hospital, No. 1 East African Stationary Hospital at Tanga, No. 2 East African Stationary Hospital at Voi, No. 3 East African Stationary Hospital at Dar-es-Salaam, No. 1 South African Sanitary Section, No. 3 South African Sanitary Section, Indian Advanced Depôt of Medical Stores, No. 3 British General Hospital, No. 6 Indian General Hospital, the European Hospital at Nairobi, African Native Base Hospital at Nairobi, Carrier Depôt Hospitals, and the hospital ships "Ebani" and "Gascon."



The casualties from the 2nd East African Division were being cleared along what was known as the western line, and those from the 1st East African Division along the eastern line. The medical problems that had to be dealt with in each case were similar, and related to sanitation, prevention of disease and the disposal of sick and wounded. The ideas of sanitation which prevailed in the towns and villages of German East Africa were primitive. Unfortunately, sanitary personnel and appliances were very scarce. Incineration was adopted as the means of disposal of refuse, and was satisfactory in dry and even in moderately wet weather, but during the torrential rains which were then beginning it was often hindered. In Morogoro, where the rainfall was 45 in. during the rainy season, great difficulty was experienced in connexion with the disposal of refuse and the Indian "Crowley cart" was used.

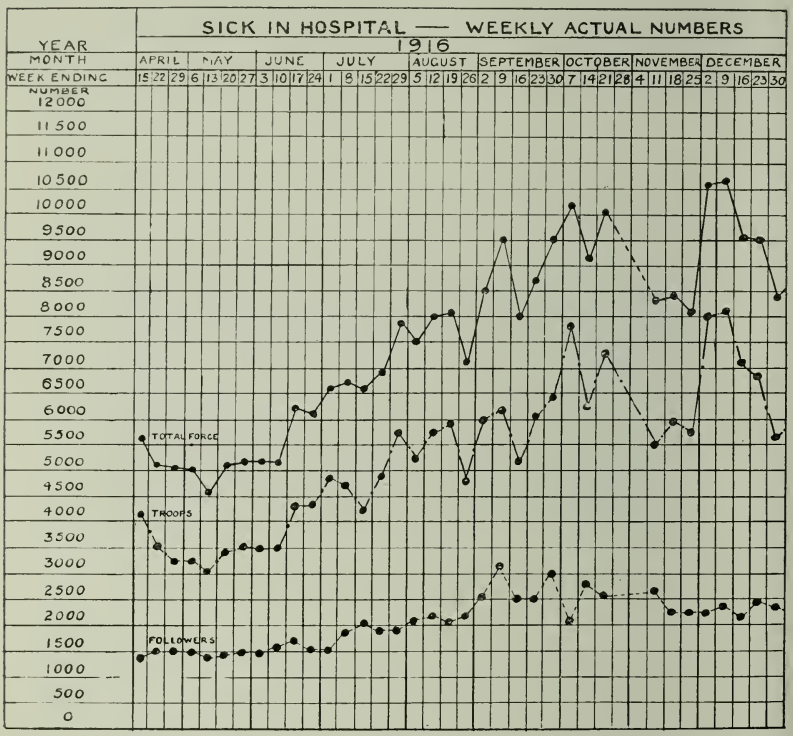
With regard to disease, malaria and dysentery were the chief enemies of the force. Efforts were made to replace the mosquito nets that had been lost or destroyed, and attempts were made to reclothe the troops, but it is interesting to note that the " shorts " which were so popular with the force in Mesopotamia were condemned as unsuitable for East Africa. Orders were issued regarding the administration of quinine and the destruction of mosquitoes. The numerous details which were so carefully carried out in Salonika with a view to the prevention of malaria could not be attempted in East Africa, and it is doubtful if they were considered. The survey by a malaria expert of towns and prospective camping grounds before occupation was not systematically carried out, nor was this made

Isolation compound for cerebro-spinal fever cases, East Africa.

compulsory. The prevalence of dysentery was no doubt due to the lack of sanitary personnel and the want of a suitable sanitary organization in the country, and also perhaps to the variety of troops employed. There was a certain amount of infectious disease, the chief outbreak being an epidemic of cerebro-spinal fever amongst the troops of the Lake Detachment. By the beginning of October 680 cases had been admitted to hospital, and there were 446 deaths. These cases occurred amongst the African troops, followers and porters, with only one exception—an Indian soldier.

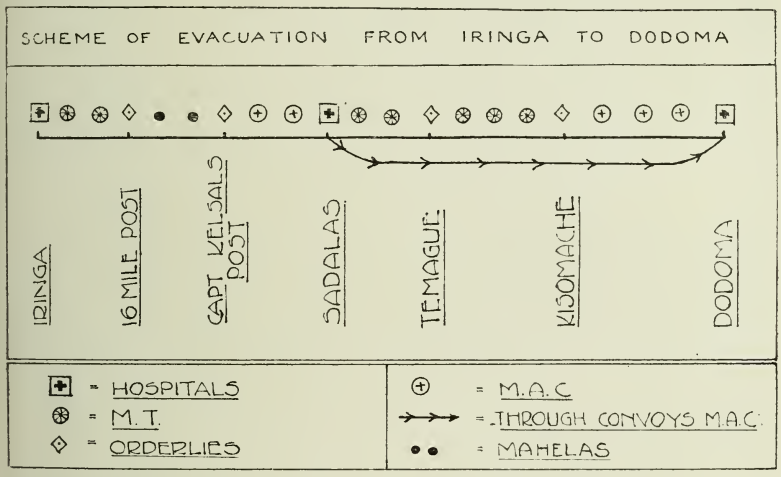
While the 1st Division was concentrated in the Kilwa area, the D.A.D.M.S., Sanitation, at headquarters inspected the area, and was not satisfied with the measures which had been adopted to prevent the spread of disease. The D.A.D.M.S.

in his report dealt with the common sanitary defects, such as the selection of unsuitable camp sites, and he emphasized the value of incineration, the most suitable hours for marching, and other elementary details important in preserving the health of troops in the field. The D.M.S. drew the attention of the G.O.C. 1st Division to these defects, so that they might be remedied as soon as possible and avoided in the future.



It is evident that at this time the prevailing idea was the defeat of the enemy, no matter how great the cost in wastage from sickness. The casualties from sickness are demonstrated in the chart showing the weekly number of cases in hospital from April to December 1916. On the other hand, the casualties from wounds were not numerous. No doubt the abnormal sick-rate was in part due to the failure on the part of the responsible military staff to recognize the importance of preventive measures against disease. The D.M.S. of the force had his headquarters

too far away. He was not always in direct communication with General Headquarters nor with the Army Commander, and most of his recommendations had to be made by correspondence. Further, rations and equipment were generally inadequate, and there can be no doubt that men who are underfed, exposed to hard fighting and unsuitably protected against weather conditions fall easy victims to disease. It must not be forgotten that the troops were drawn from many countries. There were not sufficient medical units, and when the medical staff became depleted the reinforcements sent out consisted of young and inexperienced medical officers with little knowledge of tropical medicine or sanitation, and only able to communicate with the troops under their charge by means of inefficient interpreters.



There were many difficulties associated with the evacuation of sick. The force was handicapped by lack of medical units, personnel and equipment; and even the weather played no unimportant part, for the roads became muddy, impassable swamps during rain. The outposts were far-flung, so that casualties had to be evacuated by a system of relays. In some areas they were carried by porters, while in others there was a system of porters and mule convoys, or of porters, cart convoys, and mechanical transport such as motor cars or the railway. In the case of hand-carriage by porters, the casualties were slung on hammocks: but hammocks were frequently deficient and porters went sick. Petrol and spare parts necessary for motor transport were scarce, and when motor transport drivers

became casualties they could not be replaced. There were no ambulance trains running as yet on the Central Railway and wagons, trucks or trolleys had to be improvised, and in one area a tractor was used. This complicated system of evacuation is best illustrated by the diagrammatic representation of the system adopted in evacuating cases on the western line from Iringa to Dodoma. The actual distance covered was about eighty-six miles. The scheme also shows how medical personnel was absorbed to form improvised medical units, such as rest posts, along the route. The evacuation of casualties was a slow process, and cases often accumulated in the medical units. One illustration of this only need be given. At Kilossa during November 1916 one section of a field ambulance, equipped for fifty patients, was obliged for a considerable period to retain, nurse and feed 300 patients.

CHAPTER XIX.

THE OPERATIONS IN EAST AFRICA IN 1917.

PREPARATIONS for a further advance on all fronts had been completed by 22nd December 1916. In the west, in the Iringa area, the 2nd Division, under Van Deventer, operated over mountainous country covered with dense bush. The enemy resisted the British advance and fighting continued during the 26th and 27th. On the 27th the enemy attempted to break through the British line near Muhanga, but were driven back and subsequently engaged between the Lukosse and Lungwe rivers. On the following day they again attempted to break through, but were again repulsed. Eventually they made good their escape through the dense bush under cover of darkness, and thus eluded pursuit. Northey's force had been divided up into columns which were co-operating with the troops under Van Deventer. These columns successfully attacked the enemy at Mfirika, driving him towards the east and south.

The main advance on the Mgeta front was timed to begin on 26th December, but continuous rains prevented any movement until the 31st. The force was distributed as follows: The 1st East African Brigade, known as the 1st Brigade, under Brig.-General Sheppard, occupied an entrenched position opposite the enemy. The 2nd South African Brigade, under Brig.-General Beves, was concentrated on the road between the River Ruwu and Tulo and was expected to reach Dakawa on the 25th. The Nigerian Brigade, under Brig.-General Cunliffe, was being concentrated near the River Ruwu and was to assemble at Tulo.

The two main objectives of the British force were the crossing of the River Rufiji and the capture of the German force on the Mgeta front. When the crossing of the Rufiji had been accomplished the troops would move south-east and join Hoskins' 1st Division, which was operating in the Kilwa area in the region of the Mtumbi mountains. While Cunliffe's Brigade engaged the enemy, Beves' brigade made a wide detour and on 3rd January 1917, after a continuous march of thirty miles, captured a bridge-head at Mkalinso, and at the same time two other columns worked their way round the east and west flanks of the enemy. (See Map p. 471.) The left or

east flanking column was under the command of Lieut.-Colonel Lyall, and the right or west column under Sheppard. Some heavy fighting took place but the plan to capture the enemy did not succeed. By the morning of 2nd January it became clear that the entire enemy force on the Mgeta front had retired to the south. The enemy held a strong position near Beho-Beho. Here a second attempt was made to surround him, but again he succeeded in eluding capture. He retreated to Kibambawe, where there was a bridge across the River Rufiji, and by 5th January had crossed the bridge. The men of Beves' brigade were now exhausted. They were therefore withdrawn from Mkalinso and concentrated on the right bank of the river. Cunliffe's brigade relieved them and advanced on Luhembero,

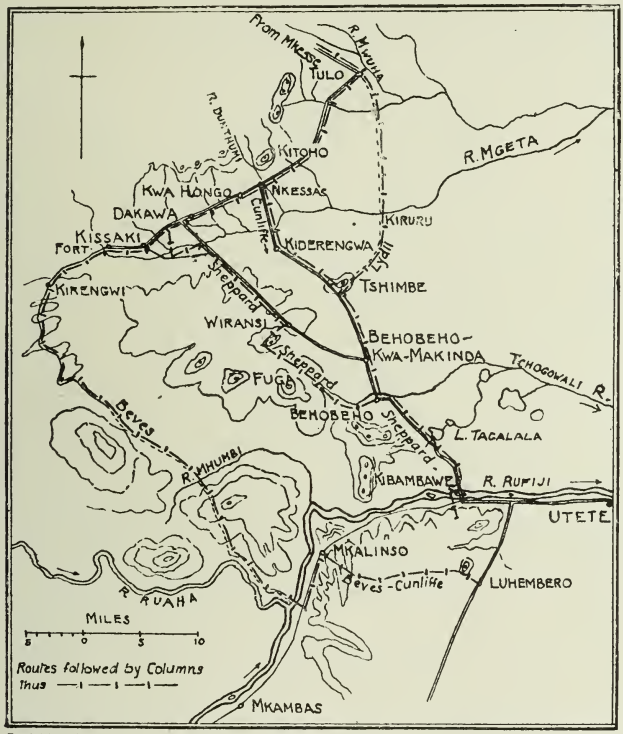
Ferry over the Rufiji river at Mpangas used for the evacuation of casualties.

which was occupied on the 18th. At the same time the troops under Sheppard and Beves cleared the enemy from the south side of the river at Kibambawe. The pursuit was continued by Cunliffe's brigade. The German force crossed the Rufiji at Utete. While these operations were in progress the 1st Division, in the Kilwa area, had moved towards the delta of the River Rufiji and occupied Mohoro on 16th January.

During these operations the total casualties from wounds and injuries received in action were 9 officers and 299 men, and the total deaths 1 officer and 17 men. The figures for carriers and followers were 36 wounded and 3 deaths.

During the actual operations difficulties were experienced similar to those described in the previous chapters. Sections of field ambulances were filled with casualties, and as there was

delay in evacuating the cases these units became immobile. The sick-rate increased from the same predisposing causes, long marches and hard fighting, inclement weather and deficient rations. In no part of the area of operations were the hardships greater than in the Kilwa region. Here the roads were bad and whenever rain fell they became impassable, so that for a time it was advisable to evacuate cases from Kibata and

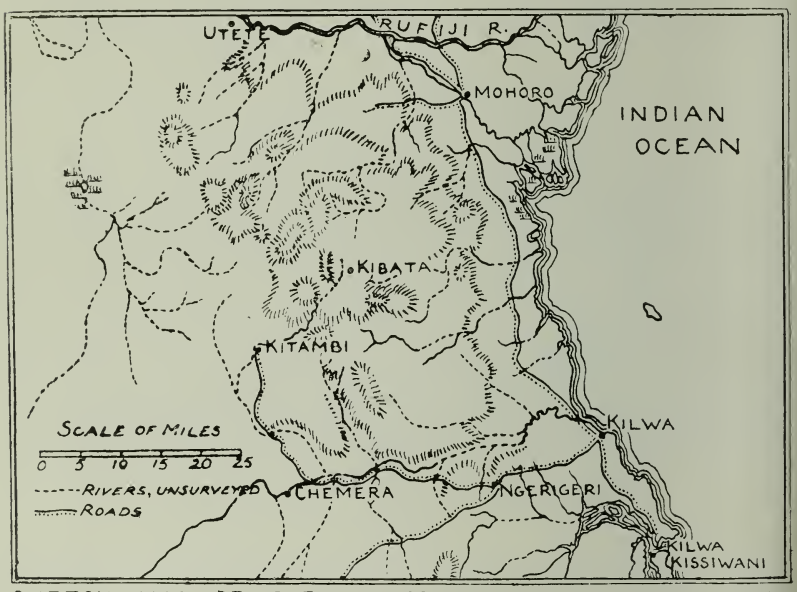


SKETCH MAP OF THE AREA OF OPERATIONS ON THE MGETA

Kitambi to Mohoro (see map p. 472) whence they could be conveyed by ship to Kilwa instead of by land transport via Chemera.

On 20th January General Smuts relinquished his command of the East African Expeditionary Force to General Hoskins. Soon after General Hoskins took over command the heavy rains commenced and continued with a violence unparalleled for many years. Operations on any considerable scale were consequently impossible. The roads which had been constructed in the Mgeta and Rufiji valleys at the expense of much

time and labour, and which had been used for motor transport during the month of January, were transformed into lakes, and supplies and equipment had to be carried by porters, often waist deep in water, and occasionally porters wading thus along the flooded roads were seized by crocodiles. Detachments performing patrol work were carried in canoes or native craft, and these vessels were also used for the evacuation of sick. The difficulty of this system of evacuation may be imagined when, for example, 70 European and 140 native patients had to be evacuated on 20th April and the succeeding



SKETCH MAP OF THE MOHORO - KIBATA - KITAMBI AREA

days from the captured German hospital situated ten miles west of Utete. This hospital had been completely isolated by the rise of the River Rufiji, and evacuation of the cases had to be carried out entirely by canoes which were paddled or pulled through the reeds. The current in the river itself was too swift even for a powerful motor boat.

As previously stated, many of the troops in East Africa had spent the rainy season of 1916 in high and comparatively healthy localities. This was not possible in 1917, as it would have meant a withdrawal from ground which had been won at some cost and might only be reconquered with equal difficulty.

During the rainy season only minor operations were indulged in, and gradually the Germans transferred the greater part of their force from the Rufiji valley to the valley of the Matandu and the hinterland of Kilwa. By the end of May they had abandoned practically the whole area north of the Matandu. Some German companies had appeared in the Lindi district at the end of April.

The chief feature of the campaign between the end of January and the beginning of May, however, was a further reorganization of the force. Most of the officers and men of the original 3rd Division had been sent back to South Africa, and it was now decided to return the personnel of the 2nd Division also, because of their debilitated condition. Steps were taken to increase the strength of the King's African Rifles, to reinforce the troops from West Africa and to bring the Indian regiments up to full strength. The former divisional arrangements were no longer suitable, and the army was reorganized into columns for the forthcoming operations, so that when the floods abated and the ground dried a concerted forward movement might be made from Lindi, Kilwa, Central Rufiji, Iringa and Songea, and possibly from farther south.

Improvements were made in the railways, new bridges were constructed and necessary repairs were carried out. The Dodoma–Tabora section was opened for traffic, so that Dar-es-Salaam was again connected by rail with Tabora ; and a branch line was constructed from Dodoma in the direction of Iringa, The Kilwa tram-line was pushed forward as rapidly as possible. These various improvements facilitated the supply of food and equipment to the troops and also the evacuation of sick and wounded. Arrangements were made for suitable water transport by the River Rufiji, and in May the first river boat from Utete reached Kibambawe.

It was clear that, as animal transport could no longer be relied upon, porters and light mechanical transport were essential. At this time, however, the force was lacking in both of these. The collection, organization and proper distribution of native porters had always presented great difficulty to the military authorities, and the medical service had to do its share in arranging for the medical and sanitary supervision of the porter corps and the treatment and evacuation of their sick and wounded. It was decided that the necessary reinforcements of porters should be recruited from the districts bordering Lake Victoria, as the inhabitants of these areas were best able to withstand the climatic conditions of German East

Africa. As regards transport, a large increase in the numbers of light motor lorries was asked for, and also considerable reinforcements of motor transport personnel, as the wastage amongst the latter had been very great. These men had been overworked and had driven their cars from early morning till late at night over roads that were never good and often dangerous. They were exposed to great extremes of heat and cold, while their messing and sleeping arrangements were haphazard and the sanitation of their camps defective. No attempt had been made to provide them with a system of rest

Stretcher devised by Lieut.-Colonel O'Gorman.

camps having tent or " banda " accommodation. Experience on other fronts had shown the difficulty of supervising such a mobile company efficiently, and in East Africa the situation was perhaps more difficult than elsewhere ; but it is evident, too, that very little attention was paid to the welfare and comfort of mechanical transport personnel.

The medical reorganization that was carried out at this point was the most comprehensive since the beginning of the campaign, but it should be remembered that the medical arrangements had become of primary importance owing to the rapid increase in the general sick-rate. The force now consisted roughly of

40 per cent. white troops, 25 per cent. Indian troops and 35 per cent. East or West African troops, and this increase in the number of coloured troops necessitated a change of personnel. The large addition of porters referred to above increased the need for special hospitals for this class of follower, now numbering about 150,000. A large reinforcement of medical officers and personnel was therefore necessary, and recruiting was commenced for an African Medical Corps in Uganda to provide subordinate personnel for carrier hospitals and trained dressers for the King's African Rifles. Extra equipment had also to be obtained, as the force had been supplying medical stores and equipment to the Belgian Expeditionary Force.

In anticipation of the operations which were likely to take place when the weather conditions improved, the medical

Carriers transporting equipment and stores along the Dodoma–Iringa road.

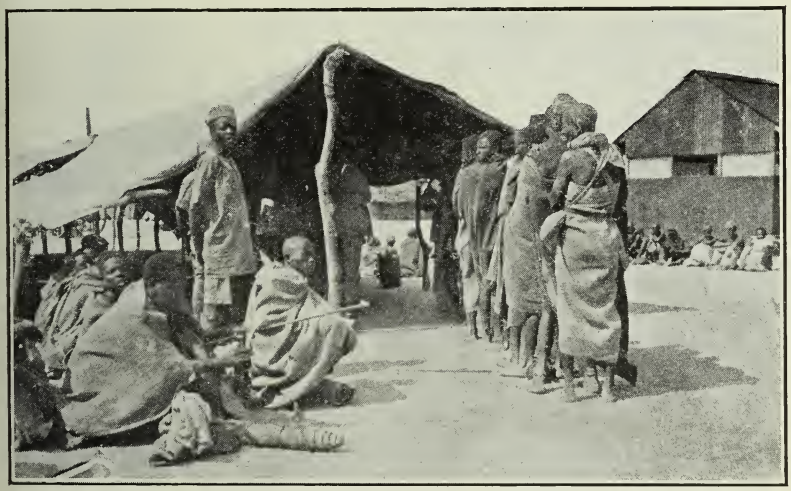
organization of every unit was carefully reconsidered. The medical equipment of field units was rendered more mobile by substituting light boxes for panniers, and each double company was authorized to have nine stretcher-bearers and two stretchers on its establishment. Two extra field ambulances, each of four sections, were on their way, one from India and the other from England. Including these units, the total number of sections available for use with the columns in the field was twenty-eight and each had an establishment of 100 stretcher-bearers and 85 porters. It was arranged that each column, in addition to such field ambulance sections as it required, should have a portion of a bearer company and a sanitary section attached. At the advanced base of each column a clearing hospital for troops and carriers was established, along with a field depôt of medical stores. An additional clearing hospital of four sections was on its way from India, and this unit and two British clearing hospitals, eight sections of an Indian

clearing hospital, six field ambulance sections and one section of a British stationary hospital, organized in India, were to form the advanced base clearing hospitals. Sick were conveyed from the field ambulances to the clearing hospitals by stretcher-bearers, and at suitable points along the route rest stations were established and staffed with medical personnel and forty-two stretcher-bearers, one medical officer being detailed to each alternate rest station. Between the clearing hospital and the stationary hospital at the column base patients were transported in empty returning supply wagons, motor ambulance

Ambulance train on the Central Railway, East Africa.

cars, or in vehicles running on tram-lines such as had been constructed at Kilwa. There were three motor ambulance convoys available for this stage of the evacuation, and in addition twenty-five motor ambulance cars which had been shipped from England to replace losses. Where the route between the clearing hospital and the stationary hospital was unusually long, rest stations were formed at intervals. An advanced depôt of medical stores was opened near the stationary hospital at each column base. The further evacuation of cases from stationary hospitals to the general hospitals concentrated at Dar-es-Salaam was carried out by the ambulance

train now running on the Central Railway, or by sea on board the hospital ship "Gascon." It was proposed to employ a hospital ship temporarily as a general hospital at Kilwa Kissiwani, until a hospital could be established on the mainland after condensers had been erected to ensure a good supply of drinking water. It was found that three light draft launches were necessary for the evacuation of cases from Utete, if the troops were to remain stationed there. At this time two Red Cross motor launches were in use, and more had been promised by the British Red Cross Society. The sick and wounded who reached the general hospitals at Dar-es-Salaam were



Carriers reporting sick at Dodoma.

ultimately returned to duty, transferred to convalescent camps, or evacuated overseas. Convalescent camps were formed at Morogoro and Dodoma for troops and carriers, and were already in use at Nairobi for Indian troops and African carriers. Many sick were evacuated by hospital ship: Imperial and South African troops and followers being sent to South Africa, Indians to India, British and West Indians to Egypt, and Protectorate troops and British East African followers to Nairobi.

Special arrangements were made for dealing with the sick of the 150,000 carriers who were attached to the force, and twenty-eight mixed rest stations, five casualty clearing hospitals and seven carrier hospitals were set apart for them, staffed with subordinate personnel drawn from the African Native Medical Corps.

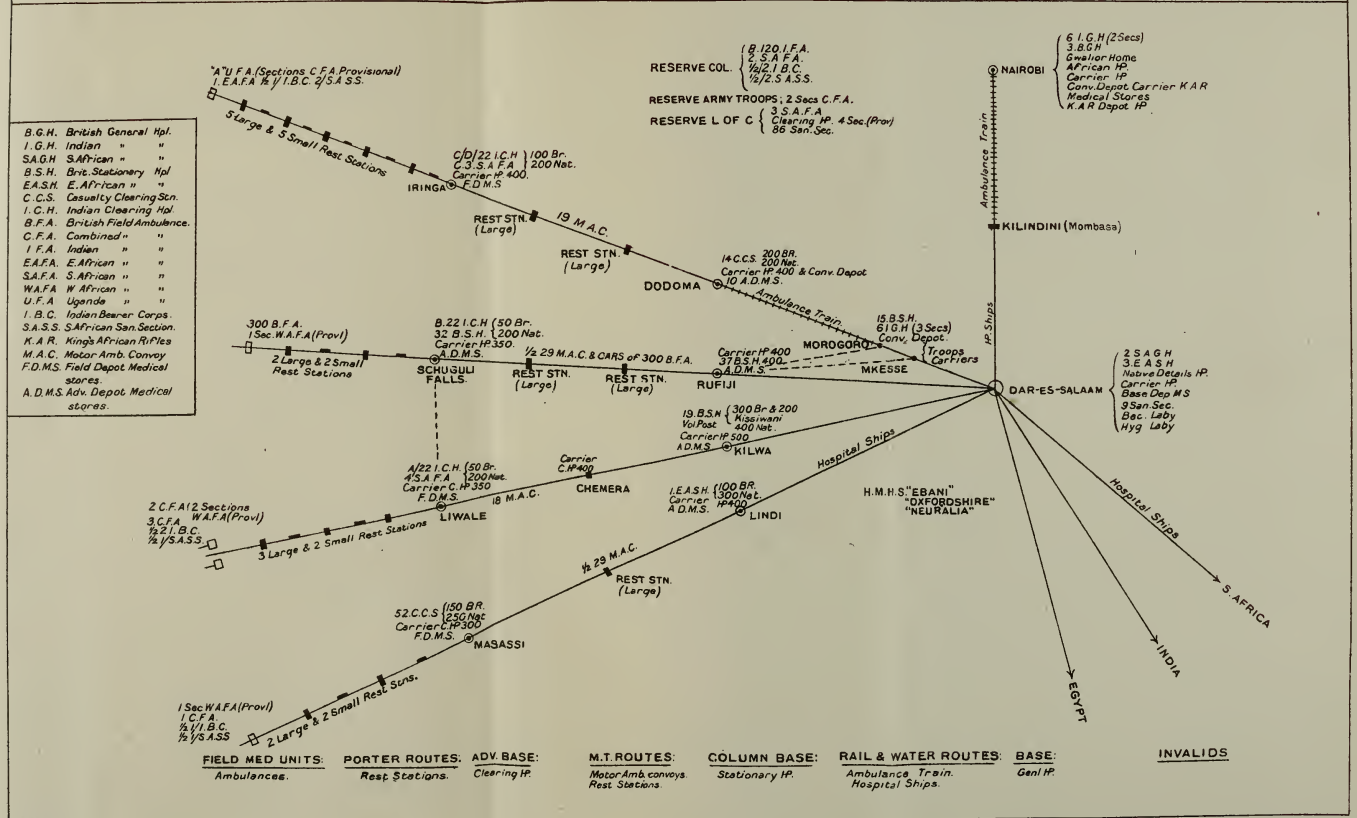
The supply of medical stores and drugs, ordnance stores and comforts was now sufficient for the needs of the force, and the British, Indian and South African Red Cross Societies were ever ready to supply additional comforts and equipment. The D.M.S., however, emphasized the fact that most of the sick would have to be evacuated by the empty supply and ammunition wagons returning to the depôts, and that the rate of evacuation would thus depend on the running of the supply and ammunition columns. The D.M.S. insisted

Ward in a Carriers' hospital.

that all medical units, equipment and stores should be in readiness at the advanced bases, and that base hospitals and clearing hospitals must be opened out before active operations commenced. The details of the medical organization he suggested at this time are shown on the diagram.

The sick-rate from 8th January to 5th May demonstrates the vast amount of sickness with which the force had to contend during the rainy period. Among the troops there were 38,333 admissions to hospital for disease, with 642 deaths. This is an average admission-rate of 206 per thousand of strength per month of four weeks, and a death-rate of 3·4. The admissions from malaria alone numbered 23,349, or 126 per thousand

DIAGRAM OF THE SCHEME OF EVACUATION PREPARED BY THE DIRECTOR OF MEDICAL SERVICES IN MAY, 1917.


B.G.H. British General Hpl.
I.G.H. Indian " "
S.A.G.H. S.African " "
B.S.H. Brit. Stationary Hpl
E.A.S.H. E.African " "
C.C.S. Casualty Clearing Stn.
I.C.H. Indian Clearing Hpl.
B.F.A. British Field Ambulance.
C.F.A. Combined " "
I.F.A. Indian " "
E.A.F.A. E.African " "
S.A.F.A. S.African " "
W.A.F.A. W African " "
U.F.A. Uganda " "
I.B.C. Indian Bearer Corps.
S.A.S.S. S.African San. Section.
K.A.R. King's African Rifles
M.A.C. Motor Amb. Convoy
F.D.M.S. Field Depot Medical stores
A.D.M.S. Adv. Depot Medical stores.
"A" U.F.A. (Sections C.F.A. Provisional)
1 E.A.F.A. 1/2 1/1.B.C. 2/S.A.S.S.
5 Large & 5 Small Rest Stations
IRINGA
C/D/22 I.C.H 100 Br. C.3.S.A.F.A 200 Nat. Carrier Hp 400. F.D.M.S.
REST STN. (Large)
19 M.A.C.
REST STN. (Large)
DODOMA
14 C.C.S. 200 BR. 200 Nat. Carrier Hp 400 & Conv. Depot. 10 A.D.M.S.
Ambulance Train
RESERVE COL. { 8/20.1.F.A. 2.S.A.F.A. 1/2/2.1.B.C. 1/2/2.S.A.S.S.
RESERVE ARMY TROOPS; 2 Secs C.F.A.
RESERVE L OF C { 3 S.A.F.A Clearing Hp. 4 Sec. (Prov) 86 San. Sec.
NAIROBI
6 I.G.H (2 Secs) 3.B.G.H Greiler Home African Hp Carrier Hp Conv. Depot. Carrier K.A.R Medical Stores K.A.R Depot Hp.
Ambulance Train
KILINDINI (Mombasa)
Hp Ships
300 B.F.A. 1 Sec. W.A.F.A. (Provl)
2 Large & 2 Small Rest Stations
SCHUGULI FALLS
B.22 I.C.H (50 Br. 32 B.S.H. 200 Nat. Carrier Hp 350. A.D.M.S.
1/2 29 M.A.C. & CARS of 300 B.F.A.
REST STN. (Large)
REST STN. (Large)
RUFIJI
Carrier Hp 400 37 B.S.H 400 A.D.M.S.
MKESSE
MOROGORO
15 B.S.H. 6/I.G.H (3 Secs) Conv. Depot.
Troops Carriers
DAR-ES-SALAAM
2 S.A.G.H 3 E.A.S.H Native Details Hp. Carrier Hp Base Dep M.S 9 San. Sec. Bac. Laby Hyg Laby
19. B.S.H { 300 Br. & 200 Vol Post Kissimani 400 Nat. Carrier Hp 500 A.D.M.S.
KILWA
A/22 I.C.H. (50 Br. 4/S.A.F.A 200 Nat. Carrier C. Hp 350. F.D.M.S.
Carrier C. Hp 400
CHEMERA
18 M.A.C.
I.E.A.S.H. (100 BR. 300 Nat. Carrier Hp 400 A.D.M.S.
LINDI
H.M.H.S. "EBANI" "OXFORDSHIRE" "NEURALIA"
Hospital Ships
2 C.F.A (2 Sections 3 C.F.A 1/2 2/1.B.C. 1/2 1/S.A.S.S.
W.A.F.A (Provl)
3 Large & 2 Small Rest Stations
LIWALE
1/2 29 M.A.C.
REST STN. (Large)
52 C.C.S. (150 BR. 250 Nat. Carrier C. Hp 300 F.D.M.S.
MASASSI
1 Sec W.A.F.A (Provl) 1 C.F.A 1/2 1/1.B.C. 1/2 1/S.A.S.S.
2 Large & 2 Small Rest Stns.
Hospital Ships
S. AFRICA
INDIA
EGYPT
FIELD MED UNITS: Ambulances.
PORTER ROUTES: Rest Stations.
ADV. BASE: Clearing Hp.
M.T. ROUTES: Motor Amb. convoys. Rest Stations.
COLUMN BASE: Stationary Hp.
RAIL & WATER ROUTES: Ambulance Train. Hospital Ships.
BASE: Genl Hp.
INVALIDS

1328

Malley & Sons, Lith.

of strength per month. The dysentery cases totalled 2,864, or 15 per thousand of strength per month. The malaria cases represented 60 per cent. of all admissions to hospital and the dysentery cases 7·5 per cent. Malaria was responsible for 26 per cent. of all the deaths in hospital and dysentery for 23 per cent. of these. Of the 38,333 cases admitted to hospital, 10,436 were invalided overseas, 43 were discharged from service, and 642 died—figures which represent an average monthly wastage of 59 per thousand of strength. The highest sick-rate was reported from Kilwa, namely, 413 per thousand of strength per month.

During the same period 33,169 followers and carriers were admitted to hospital, and 4,168 died in hospital from disease. These figures represent an admission-rate of 71 per thousand of strength per month, and an average death-rate of 9·0. Malaria was responsible for 9,629 of these admissions, or 20 per thousand of strength per month, and pneumonia for 2,342, or 5 per thousand of strength per month. Malaria caused 29 per cent. of all admissions to hospital, dysentery 18 per cent. and pneumonia 7 per cent. ; while malaria caused 12 per cent. of all deaths in hospital, dysentery 32 per cent. and pneumonia 14 per cent. The total wastage amongst followers and carriers was made up as follows : 15,845 invalided or repatriated, 4,435 deserters, and 4,168 died, an average monthly wastage of 53 per thousand of strength.

Lieut.-General Sir J. L. Van Deventer took over the command of the forces in East Africa from Major-General Hoskins at Dar-es-Salaam on 29th May 1917. At that time the enemy's forces were divided up into two main bodies. The western force, composed of between 2,000 and 3,000 men and commanded by Tafel, was based on Mahenge and held the country for a radius of about seventy miles to the west, north and east of Mahenge, with a strong detachment sixty miles from Songea on the Songea–Liwale road. The eastern and main German force was in the coastal area, facing the British forces at Kilwa and Lindi. Its strength was between 4,000 and 5,000 men, under the command of von Lettow Vorbeck, the German commander-in-chief. Other minor enemy forces were active ; one consisting of four or five companies had invaded Portuguese East Africa, while a raiding force of 600 men under Naumann had succeeded in evading the British troops and had crossed the Central Railway east of Tabora. The British force was distributed as follows : One brigade, under O'Grady, was at Lindi ; two columns under Hannyngton were stationed between Kilwa and Mohoro ;

Cunliffe's Nigerian Brigade, less one battalion, was located at Kibambawe on the River Rufiji ; the equivalent of a brigade, with as many Belgian troops, was in pursuit of Naumann ; two battalions were stationed at Iringa ; a small central reserve remained at Morogoro ; and Northey's force held the line from Ubena to Songea.

Van Deventer reports that at this time, owing to sickness, and particularly malaria, the number of men actually available in the field bore no relation whatever to the nominal strength of the force, and that a brigade that could muster 1,400 rifles was singularly fortunate. The Iringa–Ubena–Songea area was comparatively healthy and Northey's troops, though war-worn, were considerably fitter than those stationed on the

Wharves and shipping at Kilwa Kissiwani.

coast. With the exception of Mahenge and certain food-producing areas, there were no strategic objectives such as had been offered by the Moschi area, the Tanga and Central Railways, Tabora, or Dar-es-Salaam. The country held by the enemy was for the most part wild and impassable. Means of communication were practically non-existent, and even the more important bases such as Liwale or Massassi were, from the military point of view, mere geographical expressions. The true objective was, therefore, the enemy force in the field, and it was anticipated that the next offensive would be one of considerable difficulty, for the territory occupied by the enemy was over three hundred miles in extent and the country was admirably suited to defence and rearguard tactics.

General Van Deventer considered five possible lines of advance from the north and east, and although he recognized

General view towards creek and landing place for the Lindi front.

Rushes laid to improve inequalities in the road.

that Kilwa was the most unhealthy area in German East Africa, and that Lindi harbour had considerable limitations and could only accommodate a small proportion of the shipping at his disposal, he eventually decided to make his main advance from Kilwa and Lindi, and at the same time to operate against the enemy in the Mahenge area, both from Dodoma and from Kilossa. As a preliminary the country around Lindi had to be cleared of enemy troops in order to secure a good water supply and free the main exits from the town and harbour. This was accomplished by 13th June. The composition of the Kilwa force, which originally consisted of two columns, had been rearranged, and three columns had been formed.

Motor trolly and trucks for evacuation of sick and wounded in use near Kilwa–Kivinje.

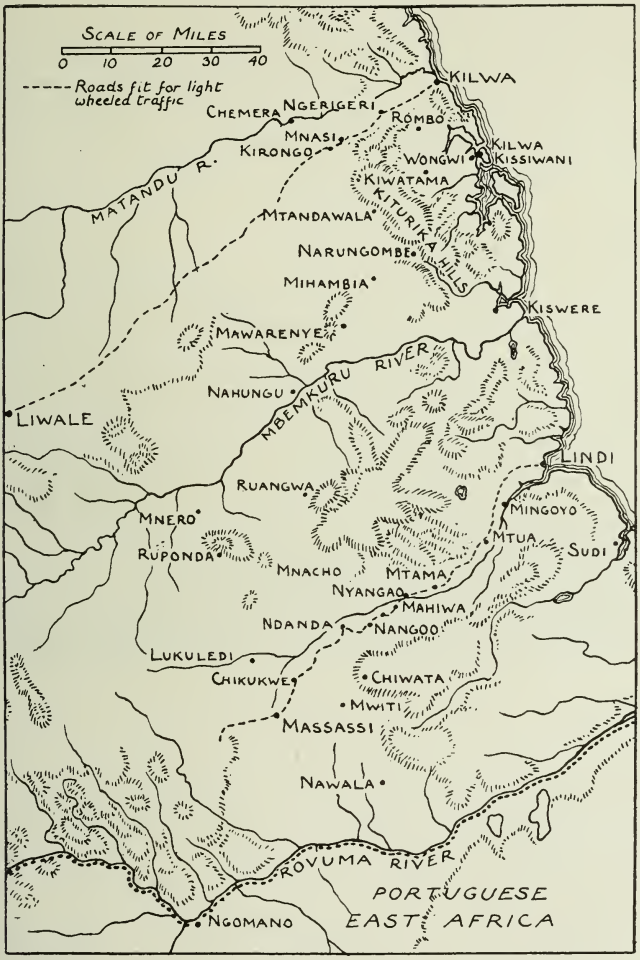
No. 1 Column contained approximately four regiments, No. 2 Column three regiments, and No. 3 Column two regiments.

North of the Central Railway the combined British and Belgian force pursued the raider Naumann.

British and Belgian columns advanced in the direction of Mahenge. The British troops were under the command of Northey. The result of these operations on the western line was to compel the enemy to withdraw his forces from other points in order to strengthen Mahenge, and the removal of enemy troops from the Lower Rufiji enabled Van Deventer to reduce his detachments there to one battalion.

The advance from Kilwa was begun on 5th July. There was some sharp fighting on the 6th, 17th and 18th in the

neighbourhood of Narungombe, and eventually the enemy was driven out of his position and retired towards Mihambia. The occupation of this area completed the clearing of the Kiturika Hills. The strength of the Kilwa force was reduced



SKETCH MAP OF THE KILWA-LINDI AREA

not so much by battle casualties as by malaria and other sickness, and the troops required rest and reinforcements before the advance could be continued. During August a tram-line had been commenced at Kilwa, and was pushed southwards as rapidly as possible; the roads were improved, transport collected and supplies accumulated. By the first

week in September the bulk of the Nigerian Brigade and one Indian cavalry and two Indian infantry regiments had been landed and were soon ready to take the field. By the middle of September the British and Belgian columns in the west had reached a point seven miles north of Mahenge, and were encircling it both on the east and west. Meanwhile, the troops in the Lindi area had made an advance and compelled the enemy force to retire. It was now decided that the troops should advance simultaneously, southwards from the Kilwa area and south-westwards from the Lindi area, engaging the

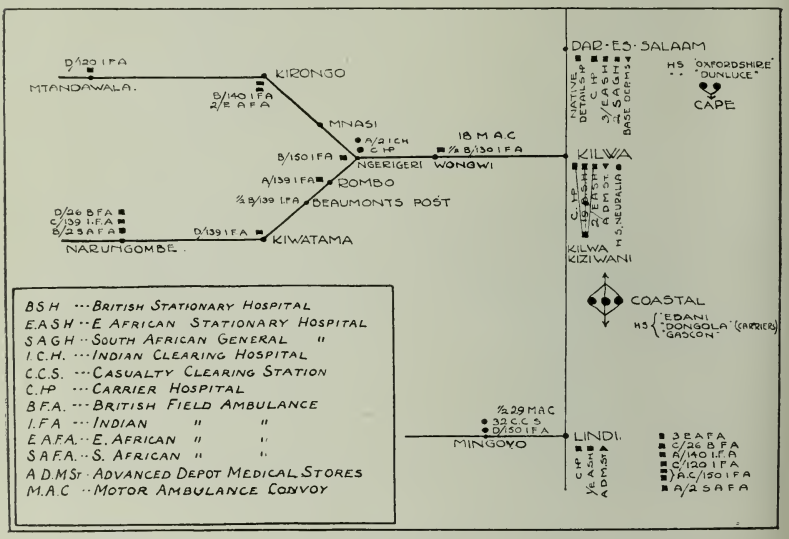


DIAGRAM SHOWING THE MEDICAL ARRANGEMENTS FOR THE OPERATIONS IN JULY 1917

enemy wherever he was met, while the western troops were to contain the enemy troops in the Mahenge area.

The Kilwa troops advanced in three columns and occupied Nahungu on 29th September (see Map p. 483). The main force of the enemy retired south-west and were concentrating in the Massassi area. Two columns and the cavalry under Hannyngton continued the pursuit from the Mbemkuru river. The Nigerian Brigade left Nahungu on 4th October, and on the 11th, after a trying march through most difficult country, gained touch with the right of the Lindi force north of Mtama. The Lindi force in its advance had had some sharp fighting between Mtua and Mtama. Hannyngton's troops reached Ruponda on the 10th and severed the main enemy communication between Liwale and Massassi, but the enemy force was able

to retire on a line east of Ruponda. The Lindi force then advanced, driving the enemy before it towards Nyangao. The engagement that followed was one of the severest in the entire campaign. The losses on both sides were heavy and it was found necessary to halt the Lindi force until reinforcements could be sent forward. The Kilwa force had now reached Lukuledi and Ruponda. The enemy's rearguard had been driven from Ruangwa and withdrew to Mnacho across a wide waterless stretch of country. The line from Kilwa had been advanced so far that, owing to food shortage, maintenance of the forces was becoming a serious problem. It was therefore necessary to call a halt in order to accumulate supplies before

Aid post in the Liwale–Kilwa area.

making any further advance, and until 6th November no further movement took place on the eastern front.

During the above operations the general scheme prepared by the D.M.S. of the force in May was adopted for evacuating casualties from the field. The lines of evacuation and the position of the medical units are shown on the diagrammatic sketch. On the whole the scheme was satisfactory, but when the troops outran their supplies during the rapid advance, it was found that the number of medical units operating with the forces was not sufficient, and there was delay in the evacuation of sick and wounded. This point does not appear to have been considered by the Headquarters Staff, nor reported to the D.M.S., a further instance of the lack of co-operation between the different branches of the service in East Africa during the preparations for an advance.

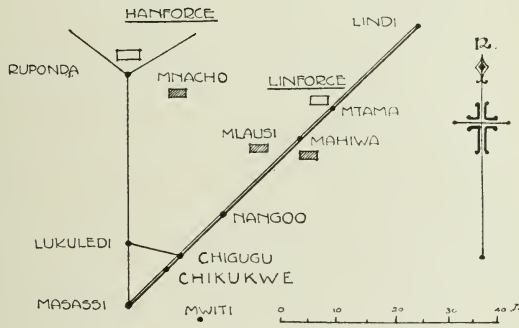
Towards the end of October the situation in the Kilwa–Lindi area was as follows: The enemy was holding Mahiwa strongly, with garrisons and food supplies distributed at Nangoo, Ndanda, Chikukwe, Chiwata, and with a well-defended water supply at Mnacho (see Map p. 483). He had twenty-five companies stationed in this area, averaging 150 rifles each, and it was anticipated that he would dispute every mile of the

Field ambulance shelters at Nyangao.

country and eventually retire to Nawala, via Chiwata. When the G.O.C.-in-C. of the British force found that his recent advance had brought him to the extreme limit of his supply arrangements he withdrew his columns to Ruponda and Ruangwa, placing his troops on slightly curtailed rations, and endeavoured to collect a reserve of food and to bring up all possible reinforcements on the Kilwa–Lindi lines. His intention was to

advance his entire force from Nyangao on Mahiwa, from Ruangwa on Mnacho, from Ruponda on Lukuledi, and either Ndanda or Chiwata, while mounted troops made for Mwiti in order to cut the enemy's line of communication and destroy his supplies. These plans were communicated to the D.M.S., who does not then appear to have received instructions to draw up a new medical scheme for the evacuation of casualties. As a rule, in other theatres of operations the representative of the D.M.S. on the staff of the force concerned was informed of any impending operations and requested to prepare a suitable scheme of medical arrangements. Such a scheme first had to be approved by the D.M.S. before being incorporated

DIAGRAM OF THE ROUTE FOR EVACUATING SICK AND WOUNDED FROM "HANFORCE" AND "LINFORCE"



by the General Staff. At this period, however, the office of the D.M.S. of the force was in Dar-es-Salaam, many miles distant from the office of the G.O.C.-in-C. This lack of association has already been commented upon, and it seems to have been one of the outstanding features of the campaign.

The D.M.S. was ultimately asked to prepare a fresh scheme. The scheme acted on is shown on the diagram facing p. 488, and was in accordance with the information given to the D.M.S., namely, that if the enemy retired south of the main Massassi–Lindi road, it was anticipated that he would make a stand at Mwiti, in which case the force based on Lindi and known as "Linforce" would advance from Nangoo and co-operate with the force based on Kilwa and known as "Hanforce." The evacuation of sick and wounded depended mainly on the Massassi–Lindi road being

free for the evacuation of casualties from "Hanforce," for if the enemy force at Mnacho remained on the north of the road it would constitute a danger to the sick convoys, and until the enemy retired south of the road evacuation was not possible. It was essential then that the "Hanforce" should continue to evacuate casualties by the Kilwa road until the Lindi route was free, and the "Hanforce" would then have to detail sections of field ambulances to act as links between it and the clearing units on the Lindi lines of communication until these were advanced and strengthened.

The approximate strength of the "Hanforce" was 6,900 troops and 9,900 followers, a total of 16,800; of the "Linforce," 8,400 troops and 7,200 followers, a total of 15,600. With the "Hanforce" there were twelve sections of field ambulances; while on the Kilwa lines of communication there were one British stationary hospital, one African stationary hospital, four sections of a clearing hospital, two sections of a South African field ambulance, two sections of a motor ambulance convoy, and four carrier hospitals. The medical units with the "Linforce" consisted of eleven sections of field ambulances, and on the Lindi lines of communication there were one section of a British stationary hospital, one African stationary hospital, one British casualty clearing station, three sections of an Indian clearing hospital, four sections of a field ambulance, one section of a motor ambulance convoy, two carrier hospitals and four carrier rest stations.

The Germans were eventually driven from their positions. Tafel's force failed to effect a junction with von Lettow Vorbeck's, and on 27th November a detachment of the former, consisting of 37 Germans, 178 Askaris and about 1,100 other natives, surrendered. On the following day Tafel himself surrendered unconditionally with 19 officers, 92 other Europeans, 1,200 Askaris and some 2,200 other natives. Von Lettow Vorbeck crossed the River Rovuma at Ngomano on 25th and 26th November and escaped into Portuguese territory, accompanied by the remainder of his forces, consisting of approximately 50 officers, 250 other Europeans and 1,800 Askaris.

During these operations up to the end of November, while Deventer was in command, the British casualties in action alone numbered 5,000 troops and 1,000 carriers and followers.

In reviewing the sick-rate for the year 1917 certain facts should be taken into consideration. During the greater part of the period five main lines of communication were in use simultaneously, three from the Central Railway, one from

To face page 488.

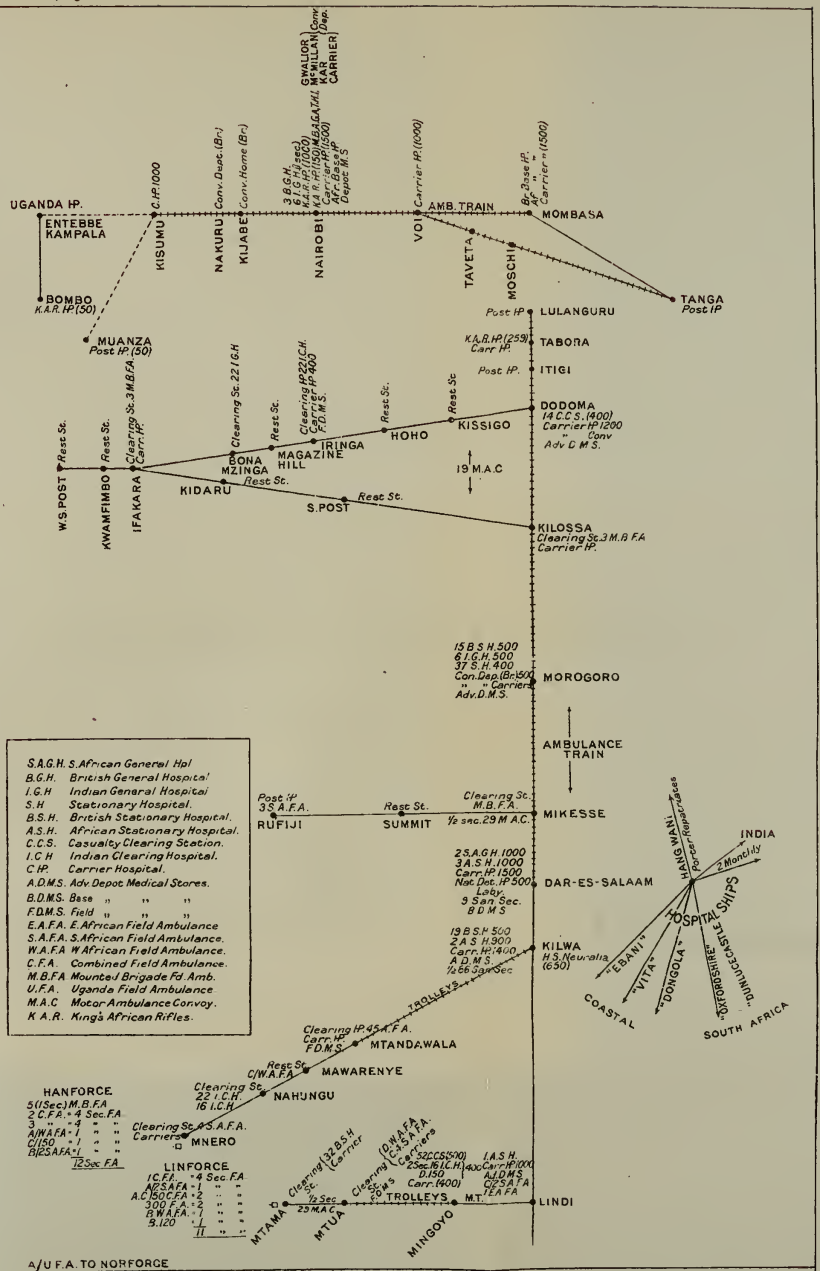


DIAGRAM SHOWING THE MEDICAL ARRANGEMENTS FOR THE OPERATIONS IN OCTOBER 1917.

1226

Malby & Sons Lith.

Kilwa, and one from Lindi. On the Dodoma line only could animals be used as a means of transport, for of the many lines organized during the East African campaign this alone was proved to be fly-free. The use of animal transport here released cars for use elsewhere, and on the Mikesse–Rufiji line the same object was attained by the employment of large numbers of local porters. This latter course was possible on account of the thickly populated nature of the area. The operations were conducted over many hundreds of miles of wild tropical country where malaria and other serious diseases were endemic, and where there was a complete absence of good roads. The troops of which the columns were composed came of many different races, each with its own ideas on sanitation and food, and there was difficulty at times in supplying suitable rations and equipment to all.

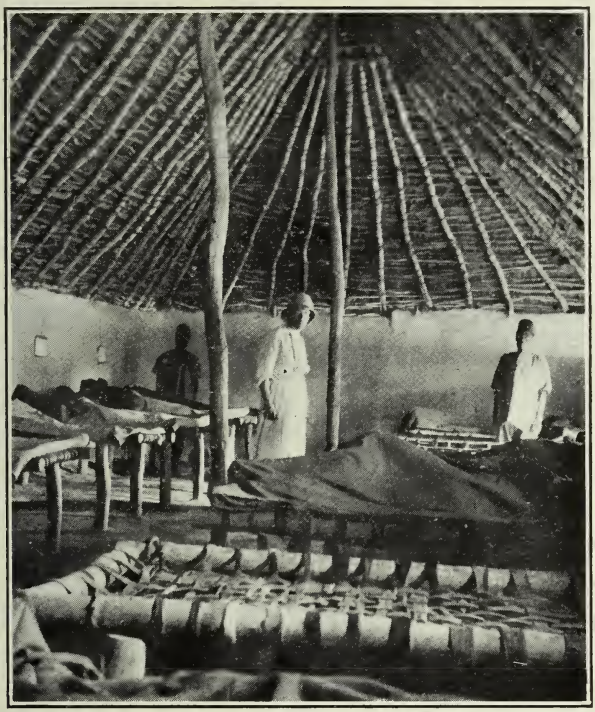
During the month of January 1917 the average number of patients of all classes in hospital was approximately 10,000. The numbers gradually increased until in November they totalled approximately 21,800. This large increase was due mainly to disease amongst carriers, of whom larger numbers were employed during the later months. For example, in January there were 2,500 carriers in hospital, while in November there were 11,500. The admissions from amongst the troops remained about the same, namely, between six and seven thousand, except in October and November when the numbers rose to nine and ten thousand. The increase may be attributed to the heavy fighting during the latter months, to the large additions of East African recruits who had not the stamina of old soldiers, and to illness amongst those who had served in the country over an extended period. Length of service in the country caused a lowering of the power of resistance to disease and delay in convalescence. The chief disease was again malaria, although the numbers admitted to hospital on account of this disease were reduced from 13 per cent. in January and 16 per cent. in March to 8 per cent. in November. The dysentery rate was about 2 per cent. per month and it varied very slightly. Pneumonia caused 1 per cent of all admissions and affected the African troops chiefly, Indians slightly, and British only occasionally. A few cases of cerebro-spinal fever occurred every month amongst the African troops mostly at recruiting depôts, and only a few isolated cases were reported amongst Indian and British troops. There was an occasional case of enteric fever, but the total number of cases was negligible.

The death-rate amongst the troops from sickness during the year remained about the same, namely, 3 to 4 per thousand of strength per month, the main causes being malaria and dysentery. The death-rate amongst followers, almost entirely African carriers, was excessive. It varied from 5 per thousand of strength in January to 27 per thousand of strength in June and 8 per thousand of strength in November. The main cause of these deaths was dysentery, and to a lesser extent pneumonia, malaria and cerebro-spinal fever. Comparison has been drawn between the excessive death-rate that occurred during the war amongst the labour corps in East Africa and the low death-rate amongst the labour corps in France. In reviewing these statistics it should, however, be remembered

Carriers halting at Tabora.

that in France the conditions were very different. There the work of the labour corps was usually confined to a definite area. The men were well housed and regularly fed. They had regular working hours and were only subjected to the ordinary wear and tear of active service conditions. On the other hand, in East Africa the poor physique of the African native must be taken into account. There was always a shortage in the supply of carriers, and consequently a lengthy training and a rigid weeding out of unfits were impossible. These men were engaged in work to which they were unsuited, in a highly malarious country under climatic conditions to which they were not normally exposed. Drinking water was often bad. Rations had to be carried from point to point, and frequently, owing to enemy action, it was impossible to cook food regularly.

It was found that the African native was very prone to disease, and unless suitably fed his powers of resistance soon became seriously reduced. Eventually greater attention was paid to the food supply and means of cooking. The meal supplied in the earlier days of the war was of bad quality; it was coarsely ground and contained a large percentage of bran.



Interior of a well-made banda ward at the Carrier Convalescent Hospital, Iringa.

Even in July 1917 consignments comprised a large proportion of badly ground yellow meal. This issue, however, was stopped, and thenceforward all carriers received a ration of white East African meal which had been sifted before issue. The quality of meal provided was in fact greatly superior to that which the native obtained in his own house. The quantity was later increased, and the cooking more carefully supervised. Subsequently training classes for cooks were held at the main

depôt. The quality of the meal was closely inspected and an expert meal tester was appointed. Carriers who were found to be unsuitable for coastal work were sent inland.

The outstanding error made during this period in connexion with the administration of the Carrier or Porter Corps was the transfer of natives enlisted from the highlands of British East Africa, to low-lying malarious parts of the German Colony, while others like the Kavirondo from the hot parts round Victoria Nyanza were employed in the highlands of German East Africa. If more attention had been paid to this detail, the high incidence of disease would have been avoided.

The medical care of the 150,000 carriers, and the numerous hospitals that were necessary threw an enormous strain on the medical services. In August 1917 the medical staff thus engaged consisted of 80 medical officers, 3 sub-assistant surgeons, 14 Roman Catholic priests, 23 nursing sisters, 24 dispensers, and 123 British other ranks. This constituted no small proportion of the total number of medical personnel available for the whole country. There were then only 245 R.A.M.C. officers, 155 other medical officers and 1,127 other ranks R.A.M.C. serving in the country, although the total requirements of the force were 450 medical officers and 1,250 British other ranks, with a monthly wastage of 15 medical officers and 105 other ranks.

At the end of July 1917 recruitment of carriers in British East Africa was stopped, as further reinforcements of carriers were expected from Portuguese East Africa.

CHAPTER XX.

THE CONCLUSION OF THE OPERATIONS IN EAST AFRICA.

WITH regard to the concluding operations of the East African campaign, when the German troops entered Portuguese East Africa further efforts were made to defeat them. Combined operations were conducted and a base was established at Port Amelia. The Commander-in-Chief of the East African Force was appointed to command the combined British and Portuguese troops. He was authorized to enforce such rules as were considered necessary to safeguard the health of both British and Portuguese troops in the area of operations.

About the end of September 1918 the Germans recrossed the River Rovuma into German East Africa. Preparations were at once made to exterminate this force and it was pursued all over the country. The German commander had still about 1,600 long service German East African porters attached to his force, and the chase was long and tiring. The enemy covered eighteen miles a day for many days at a time, and the exertions of the allied forces were no less remarkable. One column marched 1,600 miles in five months, and a certain battalion covered 1,000 miles in ninety-seven days. On 12th November 1918 hostilities ceased, and a few days later General von Lettow Vorbeck surrendered.

This campaign is unique in civilized warfare as it was one of virtual extermination. At the beginning of 1915 the German forces numbered 2,700 Europeans and 12,000 Africans. When the German commander crossed the Rovuma into Portuguese East Africa in November 1917 he was followed by 320 white and 2,500 black troops. When he surrendered he was supported by only 155 Europeans and 1,168 coloured troops.

During the campaign subordinate medical personnel for attending the carriers was gradually increased, being obtained chiefly from the African Medical Corps. The origin and development of this corps are interesting. Prior to the outbreak of war the Uganda Medical Department was unable to obtain sufficient European personnel capable of performing the duties of R.A.M.C. rank and file. Experience of the educated native, gained in the course of special work in Uganda, suggested that the Baganda might provide an excellent substitute, since this class of native speaks and writes English and

is unusually quick at learning. On the outbreak of hostilities, sanction was obtained for the engagement of forty of these natives, who were to constitute the African personnel of the Uganda Medical Service. At first peasants were employed, but these proved unsatisfactory. A number of boys belonging to the Manga High School of the Church Mission Society offered themselves, and also some boys who had been trained at the Government centre for anti-venereal work. They were enlisted for a period of six months, and during their training and on the Kagera (Uganda) front their quickness and proficiency in rendering first aid and in nursing and stretcher work were noticeable. The training, however, was hard, and at the end of the six months' period few wished to re-enlist.

When the Indian Expeditionary Forces were amalgamated

Parade of the African Native Medical Corps.

with the East African forces, and the General Officer Commanding assumed control of the East African Force, it seemed likely that the unit would be disbanded, but eventually General Headquarters sanctioned the forming of a corps to be known as the Uganda Native Medical Corps, with a strength of 130. The status of the enlisted men was raised, and they became troops and not merely followers, a matter of some importance to them, as the African soldier is inclined to be overbearing. When Tabora was captured and the Lake force disbanded, most of the men of the Uganda Native Medical Corps were paid off. A few, however, remained and were transferred with the Uganda field ambulances and attached to a regiment of the King's African Rifles. Their good work attracted attention and created a further demand for men of their type. The D.M.S. of the force asked for a report on the question of establishing a similar corps, and eventually the Uganda and East African Medical Corps was formed. This new corps

embraced all the native medical personnel then serving with the force, and new recruits were called for. The needs of the corps were explained to the Provincial Commissioner of the Uganda Province, and owing largely to the enthusiasm of the inhabitants recruits were obtained, principally from the mission schools. Very soon the D.M.S. was authorized to increase the strength to 769. The men were transferred on 8th July 1917 to Dar-es-Salaam, where the main depôt was established. They were inspected by General Van Deventer, on whom they produced a favourable impression. Standing orders similar to those laid down for the R.A.M.C. were drawn up and enforced, and when their training was completed the personnel was distributed throughout the force, some proceeding as far north as the Abyssinian border and others as far south as Durban,

Main building of No. 6 Indian General Hospital, Morogoro.

en route for Nyasaland. The reports received on their work were satisfactory. The men kept the hospital buildings clean, obtained a speedier service of food to the patients, and attended carefully to the nursing and general comfort of the sick and wounded Africans.

Many of the native hospitals possessed large native menial staffs varying from 300 to 1,000 men, and the direction and control of these by medical officers inexperienced in the ways of the country proved to be no light task. It was not unusual for a senior N.C.O. of the corps to be placed in immediate command of 500 of the menial porter staff. Here the Baganda was eminently suitable and he controlled the men under him with understanding and success. But he himself required careful handling. If well treated he was a willing, cheerful, trustworthy and industrious assistant, but unsympathetically treated he was apt to become lazy, obstinate and sulky, with

an utter disregard of personal consequences. The corps was finally extended to an establishment of ten British officers and R.A.M.C. other ranks and 1,500 native rank and file, embracing representatives of nearly every tribe in British and German East Africa.

The increase of hospital patients was met by a reorganization of the medical units set apart for carriers, and by the formation of new and the expansion of existing hospitals. The necessary

Church used as a hospital, East Africa.

personnel was obtained principally from England and by the creation of the African Native Medical Corps. New King's African Rifles hospitals were established, African stationary hospitals were enlarged, a West African field ambulance was formed, and the stationary hospital for West Africans was doubled in size. Increased accommodation was also provided for European sick in hospitals and in convalescent depôts. The personnel of field ambulances was increased in order to provide for the various classes of patients requiring treatment. In addition, the medical care of Belgian troops and carriers and

Later type of hospital ward, No. 3 South African Stationary Hospital, Dar-es-Salaam.

No. 2 South African Hospital on the sea-front at Dar-es-Salaam.

their evacuation from the sphere of active operations to the Central Railway had to be provided for. The medical units during 1917 could provide accommodation for 4,080 British, 1,835 Indians, 3,562 Africans, 3,175 mixed (chiefly in field ambulances) and 12,850 carriers.

The increase of hospital patients had necessitated extra measures for evacuation overseas. Two hospital ships, the "Ebani" and the "Vita," were employed on coastal work. A bi-monthly evacuation to India by hospital ships sent from India was maintained, and when active operations were in progress an extra hospital ship called at Dar-es-Salaam every ten days to ease the congestion. Two hospital ships were employed regularly between Dar-es-Salaam and the Cape for the evacuation of sick to South Africa. In addition, casualties were

Dhows used for the transport of native sick from Kilwa Kivinje to Kilwa Kissiwani.

evacuated to Egypt and West Africa in hospital ships as the necessity arose. At first the arrangements for the evacuation and repatriation of sick East African porters were bad, but they were reorganized and a special hospital ship, the "Dongola," was provided. It was arranged that these porters should be received into large hospitals and convalescent camps in East Africa, whence they were passed to their homes under the supervision of the commissioner of the district in which they resided.

The medical service had many and often insuperable difficulties to contend with. Probably in no previous campaign in the tropics had so many sick and wounded to be evacuated from front line units under such difficult conditions. The transport of sick by porters or by motor ambulance cars and mechanical

transport over the roughest roads must often have occasioned very great discomfort to the sick and wounded; but every effort was made by the personnel of the medical service to minimize the discomforts of the evacuation along the extensive and difficult lines of communication.

Latterly the supply of medical stores, drugs and comforts

Sick being carried in a machilla along the Kilossa–Ruaha Road.

was adequate, and despite the difficulties of transport advanced units received all their demands, except in a few instances where lack of overseas transport caused a temporary delay.

It was not until August 1917 that the sanitary organization of the force was placed on a proper basis. Up till then the D.M.S. of the force had merely been assisted by a D.A.D.M.S. (Sanitation). It seems strange, in a campaign such as this, with its high sick-rate and great variety of troops, requiring different foods, methods of cooking, camps, clothing, washing

places and latrines, that the sanitary organization was not immediately placed upon the same definite footing as in other forces. A reference to the diagrammatic chart will show the administrative organization that was brought into being. It is worthy of special attention, for it demonstrates the vast area under the control of the D.M.S. of this force. An improvement was also made in the administrative medical organization for carriers. The duty of adviser on carrier medical problems had previously been fulfilled by the Senior Medical Officer at the

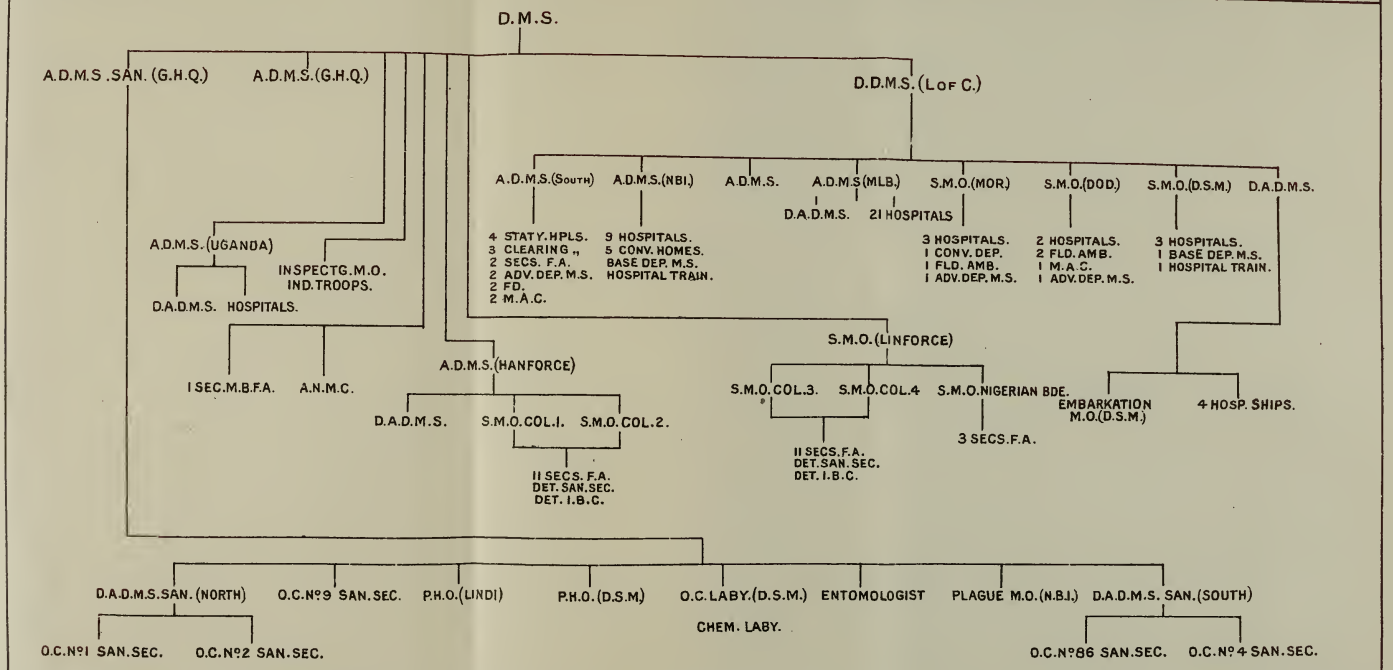
Convoy of sick at Jumbo–Mjwena.

Military Labour Bureau. The D.M.S. insisted that the status of this officer should be raised and that he should rank as an A.D.M.S. and have a D.A.D.M.S. to assist him, both staff officers being under the jurisdiction of the D.D.M.S., L. of C.

The absence of an adequate laboratory organization and skilled advisers in tropical medicine, both for white and coloured troops, is remarkable. Even the simplest measures were lacking for combating the spread of tropical diseases. There was a shortage of microscopes, and those tropical diseases which depend largely on microscopic findings for a diagnosis were consequently in many cases never diagnosed. The want of the

To face page 500.

DIAGRAM OF THE MEDICAL ADMINISTRATIVE ORGANIZATION IN 1917.



NBI.=NAIROBI : MLB.=MILITARY LABOUR BUREAU : MOR.=MOROGORO : DOD.=DODOMA : DSM.=DAR-ES-SALAAM : P.H.O.=PORT HEALTH OFFICER : I.B.C.=INDIAN BEARER COMPANY.

1326

Malby & Sons, Lith.

microscope was particularly felt in treating the many cases of dysentery that occurred, for in this disease without microscopic examination of the stools there can be no certainty whether a case is amœbic, bacillary, or bilharzial, and the absence of a proper diagnosis leads to faulty treatment, invaliding, and waste of an expensive drug, the drug generally used being emetin, which even in powder form cost £233 6s. 8d. per lb. There were other diseases which were difficult and often impossible to diagnose without recourse to the microscope. These were relapsing or spirillum fever, cerebro-spinal fever, sleeping sickness in its early stages, ankylostomiasis, and other helminthic disorders, all of which had occurred. In addition, there were skin and other affections amongst the native troops and carriers, which could only be determined by microscopic examination. It has been stated that the great majority of medical officers sent out to East Africa lacked any special knowledge of tropical diseases, and that a microscope in their hands would have been useless ; but all medical officers are trained to make use of the microscope, and whenever one was available they did so with enthusiasm. There is little doubt, however, that had a skilled clinician or a proper laboratory organization been available the force would have greatly benefited.

Entomologists are essential in a country where many kinds of disease-carrying and noxious insects abound. In East Africa there was a number of men with special entomological knowledge. The services of Dr. W. M. Aders, Economic Biologist to the Government of Zanzibar, and of Dr. Spurrier, when they were available, were requisitioned, and the force benefited from their advice on anti-malarial measures. There was also an abundance of dangerous animals, such as the larger carnivora, snakes, scorpions, centipedes, and other pests. Greater advantage might have been taken of the advice offered in 1916 by Dr. W. A. Lamborn of the Imperial Bureau of Entomology. He did all he could to warn and advise officers of the veterinary service as to the danger from both tsetse and filth-breeding flies, and as to the best means of averting the heavy losses in transport animals and cavalry horses which inevitably result from want of due precaution when operating in a fly-infested country.

The annual wastage in animals was exceedingly great. For example, during the three months from the middle of September to the middle of November 1916, 10,000 horses, 10,000 mules, 11,000 oxen and 2,500 donkeys are reported to have been lost,

and the despatches bear witness to the large number of animal casualties. These losses indirectly affected the medical service by diminishing transport and thus interfering with the proper supply of food and equipment to the troops and hindering the evacuation of casualties. Slaughter cattle for feeding the troops had sometimes to be brought from long distances, and according to one despatch the prevalence of East Coast fever, rinderpest and trypanosomiasis caused heavy mortality amongst the droves of cattle on the way across country from British East Africa. The extremely heavy mortality amongst horses, mules and donkeys in the field was attributed mainly to trypanosomiasis, and to a lesser extent horse sickness.

Bee-hive huts built for rainy season, Tabora.

The D.M.S., in his endeavour to promote the well-being of the troops and to diminish the sick-rate amongst them, repeatedly represented to the General Staff, particularly before the commencement of the rainy season, the absolute necessity of providing suitable camps for the troops, with adequate shelter and within easy reach of supplies and clearing hospitals. Unfortunately his advice was not always followed. The question of building huts such as were in existence in other theatres of war was considered towards the end of 1917, but as the necessary materials would have had to be transported from other countries, and as the campaign in East Africa was now drawing to a close, the scheme was abandoned on account of the time and expense entailed.

In August 1917 Major-General W. W. Pike, A.M.S., and Lieut.-Colonel Andrew Balfour, R.A.M.C., arrived in East Africa. They had been specially detailed by the War Office to proceed to East Africa in order to examine and report upon all matters affecting the health of the troops, British and native, including followers, and the hospital provision for such troops and followers ; on the rations, clothing and comforts supplied ; on the provision of bacteriological laboratories, and on the scientific investigations in any recent outbreak of disease amongst the native followers from South and East Africa. General Pike had had a large experience of medical administration in India, and had been D.D.M.S. of the Indian Army Corps in France and subsequently D.M.S. of the First Army, while Colonel Balfour had been a member of the advisory committees that had visited Egypt, the Dardanelles, Salonika and Mesopotamia. They furnished a detailed report to the War Office, and while in East Africa had the power to telegraph summaries of their interim reports direct to the War Office.* They made a comprehensive survey of the whole field of operations, and their investigations were continued over a period of several months. They were able to give the medical service in East Africa the benefit of their broad experience. They appreciated the difficulties with which the force had to contend, and their advice was eagerly sought. The visit of this committee did much to improve the medical service.

In the report they submitted to the War Office, General Pike and Colonel Balfour drew attention to the deficiency of the scientific and sanitary branches of the medical administration and the comparative ignorance of measures adopted in other war areas with regard to rations and prevention of disease. They stated that there had been lack of initiative and driving power in the personnel of the medical staff, and that at the time of their visit, although medical and sanitary arrangements had already been greatly improved, there was still room for improvement in many directions. They alluded to the complete dependence of the medical services on other departments of the force ; if these failed them in any way, whether as regards supplies, transport facilities, or through disregard of advice or slowness in acting upon a recommendation, then the responsibility did not rest with the Director of Medical Services. They emphasized the fact that, once a vicious circle has been established in the case of tropical disease, it was often well-nigh impossible to combat it.

* Prompt action was at once taken and many experts in different subjects were sent out as the result of cables addressed to the War Office.

Even to the last the greatest enemy of the East African Force was disease, especially malaria, which thinned the ranks to an alarming extent. Towards the end of the campaign the troops suffered also from the pandemic spread of influenza. These and other diseases taxed the resources of the medical service to the utmost and claimed a far larger number of victims than the weapons of the enemy.

The approximate yearly casualties sustained by the East African Expeditionary Force during the whole campaign, excluding the numbers admitted to hospital for sickness, are shown in the following tables :—

Approximate Casualties by Years in the East African Expeditionary Force (including Uganda and Nyasaland).

Year.	Killed.		Died.				Total. Deaths		Wounded.		Missing and Prisoners		TOTAL.	
			Wounds.		Disease.									
	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.
1914 (from Sept.)	35	390	1	25	—	16	36	431	48	368	3	101	87	900
1915	17	160	2	21	3	231	22	412	22	316	15	282	59	1,010
1916	48	531	16	178	28	1,076	92	1,785	112	1,791	3	93	207	3,669
1917	101	1,123	35	404	41	2,529	177	4,056	248	3,956	20	421	445	8,433
*1918 ..	15	271	2	70	53	2,123	70	2,464	84	832	25	338	179	3,634
Total ..	216	2,475	56	698	125	5,975	397	9,148	514	7,263	66	1,235	977	17,646

* Casualties occurring up to November 1918 and after that date.

Approximate Casualties by Years in the East African Expeditionary Force, Indian and African Followers.

Year.		Killed & died of wounds.	Died of disease, etc.	Total deaths.	Wounded.	Missing.	TOTAL
Total to 31.12.15	Indian	5	51	56	2	7	65
	African	36	1,657	1,693	7	264	1,964
	Total	41	1,708	1,749	9	271	2,029
1916.	Indian	3	88	91	8	5	104
	African	78	3,956	4,034	136	4	4,174
	Total	81	4,044	4,125	144	9	4,278
1917 and up to 30.9.1918	Indian	2	137	139	1	1	141
	African	252	36,339	36,591	1,179	354	38,124
	Total	254	36,476	36,730	1,180	355	38,265
TOTAL.	Indian	10	276	286	11	13	310
	African	366	41,952	42,318	1,322	622	44,262
	Total	376	42,228	42,604	1,333	635	44,572

CHAPTER XXI.

THE MEDICAL SERVICES DURING THE OPERATIONS IN THE ADEN PROTECTORATE.

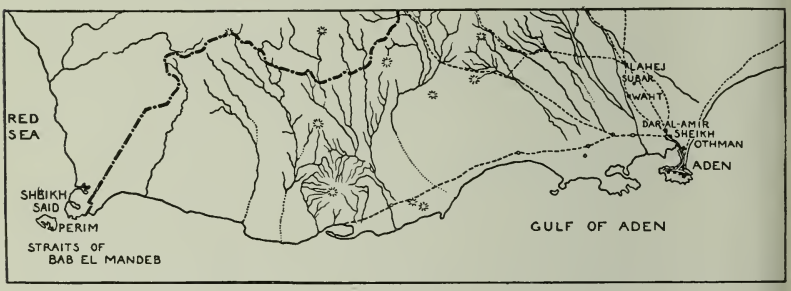
THE strongly fortified town of Aden lies on the southern coast of Arabia, one hundred miles east of the Red Sea. It is built on a barren peninsula, fifteen square miles in extent, and connected with the mainland by a narrow neck of sandy ground. It is a port of call and coaling station for vessels on the Suez Canal route to and from India. The Aden Protectorate is politically a dependency of Bombay and covers a wide area. The frontier between British and Turkish territory runs from Sheikh Said, the peninsula which divides the Red Sea from the Gulf of Aden, in a general north-easterly direction. Except for part of its southern beach, Sheikh Said lay in Turkish territory. The British island of Perim, also used as a coaling station, lies two miles from the Arabian shore in the Straits of Bab-el-Mandeb.

In the days before the war Aden was garrisoned by a small detachment of British and Indian troops. The houses, being constructed on modern lines, were suitable for combating the heat and discomforts of the climate. There was a station hospital for British troops, a hospital for Indians, and a European civil hospital. The town was well supplied with shops, and there were clubs both for officers and men, well-built barracks, recreation grounds, canteens, and soda-water and ice factories. In connexion with the medical history of the military activities in the Aden Protectorate during the period of the Great War, it should be remembered that the operations were comparatively unimportant. They were conducted from a base in constant touch with civilization, owing to the number of vessels touching at the port, and the senior officers stationed at Aden had some knowledge of the climate and the local resources.

On the outbreak of war the Turks attempted to strike a blow at the entrance to the Red Sea. They gathered in some strength on the Sheikh Said peninsula, and ineffectively shelled Perim lighthouse and coaling station. The 29th Indian Infantry Brigade on its way to Egypt in November 1914 was ordered to capture Sheikh Said; about the middle of the month the brigade landed, and after a sharp engagement defeated the

Turks and drove them inland. Having destroyed the enemy works and fortifications at Sheikh Said, the troops re-embarked and continued their voyage to Egypt.

Lahej, the capital of an Arab state, lies at the foot of high mountains some twenty-five miles north of Aden. The road from Aden to Lahej passes over level country covered partly by scrub, partly by sand and partly by bare rock. A large force of Turks and Arabs, with some field guns, had concentrated in the neighbourhood of Lahej. On July 3rd the Aden Movable Column advanced to attack this force and reached Sheikh Othman, an oasis which lies on the route to Lahej, seven miles north of Aden. The force was accompanied by two sections of a field ambulance, the equipment being carried by camels, and it was arranged that the sick and wounded



SKETCH MAP OF THE ADEN PROTECTORATE

would be evacuated by camel transport by means of the old-fashioned *kajawahs*.

The advance was continued early the following morning, but only the advanced column, consisting of about 250 rifles with two guns, reached Lahej by the afternoon. July is one of the hottest months of the year in this part, and the intense heat, the sand and the shortage of water rendered the march extremely trying. Many of the troops fell out on the way. The hired camelmen with their camels went over to the enemy, taking with them the greater portion of the equipment of the field ambulance sections which they carried. In the fighting that took place the advanced guard of the British force was defeated, and in view of the distressed condition of the main column the British troops retired within the Aden lines. The Turks thereupon occupied Sheikh Othman.

This was the first action in which the Aden force was engaged, and the garrison troops had not been trained to fight under these trying conditions. The medical arrangements had

apparently not been carefully considered. The supply of such important items as water and ice had not been arranged for, and these were the first things that were urgently called for when the force became incapacitated during the advance and numerous cases of heat-stroke were occurring. The field ambulance sections had been hastily organized, and transport not authorized in the mobilization store tables was not available for carrying extra supplies, such as water and ice. When the A.D.M.S., Colonel H. F. Cleveland, I.M.S., was informed of the distressed condition of the troops, he at once collected a supply of 100 gallons of water and 100 lb. of ice, which he conveyed to the forward area by motor car. The lack of previous arrangements for the supply of water and ice to the mobile column is all the more remarkable in view of the fact that everyone stationed in Aden had always been accustomed to a plentiful supply of both commodities. Extra medical assistance was improvised, and local stretcher-bearers were enlisted to assist in the evacuation of casualties. The missionary doctors from Sheikh Othman were asked to take charge of the European hospital in Aden and to assist in the Indian infantry base hospital.

After this reverse the force at Aden was strengthened. Two batteries of artillery, and the 28th Infantry Brigade, consisting of the 51st and 53rd Sikhs, the 56th Rifles and the 62nd Punjabis, were dispatched from Suez. Other units that served in Aden at different times were the South Wales Borderers (Brecknockshire Battalion, T.F.), the 60th and 89th Punjabis, the 109th Infantry, the 126th Baluchistan Infantry and the Malay States Guides. The medical establishment was reinforced at this time by the arrival of No. 105 Indian Field Ambulance, attached to the 28th Infantry Brigade. Other medical units subsequently despatched from India for service at Aden were one section of No. 10 British Stationary Hospital, equipped for 25 beds ; one section of No. 80 Indian Stationary Hospital, also equipped for 25 beds ; and one section of No. 26 Indian General Hospital, 100 beds.

With the arrival of reinforcements, preparations were made for an attack on the Turks occupying Sheikh Othman. The 28th Brigade and other troops marched out on the morning of 21st July 1915, and completely surprised the enemy at Sheikh Othman, driving him northwards. The British casualties in this affair numbered twenty-five in all. The medical arrangements for this attack had been more carefully considered, owing probably to the fact that the field ambulance

attached to the 28th Infantry Brigade had previously served with it in Egypt. On 16th July the staff officer of the brigade consulted the A.D.M.S. with regard to the scheme for the evacuation of its sick and wounded. It was decided that two sections of No. 105 Indian Field Ambulance would accompany the force, and that the remaining two sections, with the addition of some British personnel, would establish themselves at the Maala wharves in Aden. These latter sections were ordered to organize the large wharves into comfortable hospital wards to act as the main hospital for the reception of casualties evacuated from the area of operations. The officer commanding No. 105 Indian Field Ambulance at once set to work to obtain a supply of beds, mattresses, stretchers and feeding utensils. Suitable arrangements were made for the lighting of the hospital, and in the course of a few hours an excellent improvised hospital had been organized. In view of the anticipated operations, all the available ambulance transport, consisting of twelve ambulance tongas and a few motor cars, had been placed at the disposal of the senior medical officer accompanying the attacking force. The sick in Aden were retained in the section hospital at the Crater, and the European Hospital was reserved for officers. All medical officers attached to units in Aden were forbidden to leave the precincts of their units.

After the attack the main body of the troops pursued the Turkish force in the direction of Dar-al-Amir, and the field ambulance sections attached to the 28th Infantry Brigade moved forward to Sheikh Othman, where an advanced dressing station was established in the missionary doctor's house. The sick and wounded were quickly collected, and by 5 p.m. of the 21st all casualties had been transferred to Aden. Two days later the medical units of the Aden Force were distributed as follows : Two sections of No. 105 Indian Field Ambulance were attached to the operating force, and the remaining two sections were at Maala wharves, as noted above. The section of No. 10 British Stationary Hospital and the section of No. 80 Indian Stationary Hospital were stationed on the isthmus, while in Aden itself were the British Station Hospital with a section at the Crater, a section of No. 26 Indian General Hospital, and the European Hospital.

During August the 28th Infantry Brigade routed two Turkish garrisons, and on 25th September the enemy were surprised and defeated at Waht, south-east of Lahej. With the clearing of the enemy from the vicinity of Aden the British offensive

came to an end. The British line spread out fanwise, and Sheikh Othman was transformed into a strongly fortified camp, connected by rail with Aden. The Turks made their headquarters at Lahej, carrying out occasional raids on the British posts and from time to time shelling the railway.

The march against Waht and subsequent attack on the Turkish force were remarkable for the number of cases of heat-stroke and exhaustion admitted to the field ambulance. To evacuate these cases all available transport was dispatched to the area of operations, and thenceforward two additional camels were allotted to the field ambulances to carry a supply of ice. The slabs of ice were covered with sacking and packed in sawdust in wooden boxes.

It is interesting to note the effect of the Turkish occupation of Sheikh Othman on the conservancy arrangements of Aden. Camels were largely used for removing the filth and waste products of the town, the fodder for these animals being obtained from the oasis of Sheikh Othman. When this place was captured by the enemy the fodder supply ceased, with the result that the animals starved and became unfit for work. The A.D.M.S. had then to recommend more primitive methods of sanitation. Old rubbish pits were reopened and at certain places refuse was thrown into the sea.

During the campaign there was an outbreak of pemphigus, and the disease was thought to be contagious. At one time there were over ninety cases, principally amongst the British personnel. The blisters varied in size from a threepenny bit to a five-shilling piece. Some of the medical officers in Aden attributed the disease to a lack of calcium salts in the diet. A special ward for these cases was opened by No. 105 Indian Field Ambulance at Maala.

The health of some of the British units was unsatisfactory, and as a result of one medical examination ninety-four men of the Brecknockshire Battalion (T.F.) were considered unfit for duty, and the remainder only fit for garrison duty. There was an outbreak of scurvy amongst the 60th Punjabis.

The force was reorganized into the Aden Infantry Brigade and the Movable Column, the latter consisting of the 28th Brigade and several other units. The greater portion of the former was located at Kharmaksar, situated midway between Sheikh Othman and Aden. Administrative changes took place gradually in the medical service. At first the senior officer in command of the field ambulance operating with the

mobile force acted as the S.M.O. of the force and was responsible for the entire medical arrangements. Subsequently, a D.A.D.M.S. was appointed to the Movable Column. His duty was to make all the arrangements for the evacuation of the sick and wounded, and he was assisted by an officer who supervised the medical arrangements on the lines of communication. All the motor ambulance cars available were assembled and organized into an improvised convoy, the cars being sent to the mechanical transport depôt from time to time for examination and repair. Plans of a desert cart were sent from Egypt. These carts were constructed locally and found to be much more satisfactory than the camel *kajawahs* for evacuating wounded from the field.

The embarkation duties of the medical staff were at all times of an anxious nature. Owing to the number of vessels calling at Aden, numerous cases of infectious disease, such as smallpox, diphtheria and plague, were notified, and arrangements had to be made for the removal and segregation of the cases and contacts. Ships carrying pilgrims were a frequent source of trouble. As no regular hospital ship had been detailed for the evacuation of British and Indian sick and wounded, cases were placed on board any vessel where accommodation was available, the British being evacuated to Egypt and the Indians to India.

Towards the end of 1915, when combatant units were transferred from Aden to other fronts, No. 105 Indian Field Ambulance departed with the 28th Infantry Brigade. This field ambulance was replaced by a section of a British field ambulance and two sections of an Indian field ambulance sent from India.

In January 1916 the Aden Movable Column inflicted considerable losses on the enemy near Subar. The British casualties were five killed and thirty-five wounded. In March the Turkish force, reinforced by a few Germans, unsuccessfully attacked the village of Imad, situated on the trade route between Aden and the east. The British casualties as the result of this attack were one killed and seventeen wounded. In another engagement during March, at a place six miles north of Sheikh Othman, a Turkish column was surprised on the march and heavily defeated, the British losses totalling eight killed and thirty-three wounded. During this operation the A.D.M.S. moved out to Sheikh Othman, and the section of No. 10 British Stationary Hospital was opened in the upper storey of the missionary hospital, Indian sick and wounded

being received by a section of an Indian field ambulance in the lower storey. Extra medical officers and personnel were sent out to assist.

In time the medical arrangements of the Aden force became well organized, in conformity with the routine laid down in Field Service Regulations.

After the early months of 1916 no fighting of any consequence took place in the Protectorate, and many of the troops were transferred to other fronts. An adequate force, however, was maintained for the future defence of Aden. The only disadvantage resulting from the proximity of the Turkish force from 1916 onwards was the interference with the supply of fresh vegetables and fruit. The supply ceased, and these had to be brought in cold storage from Egypt or India.

CHAPTER XXII.

THE CAMPAIGN IN NORTH RUSSIA.

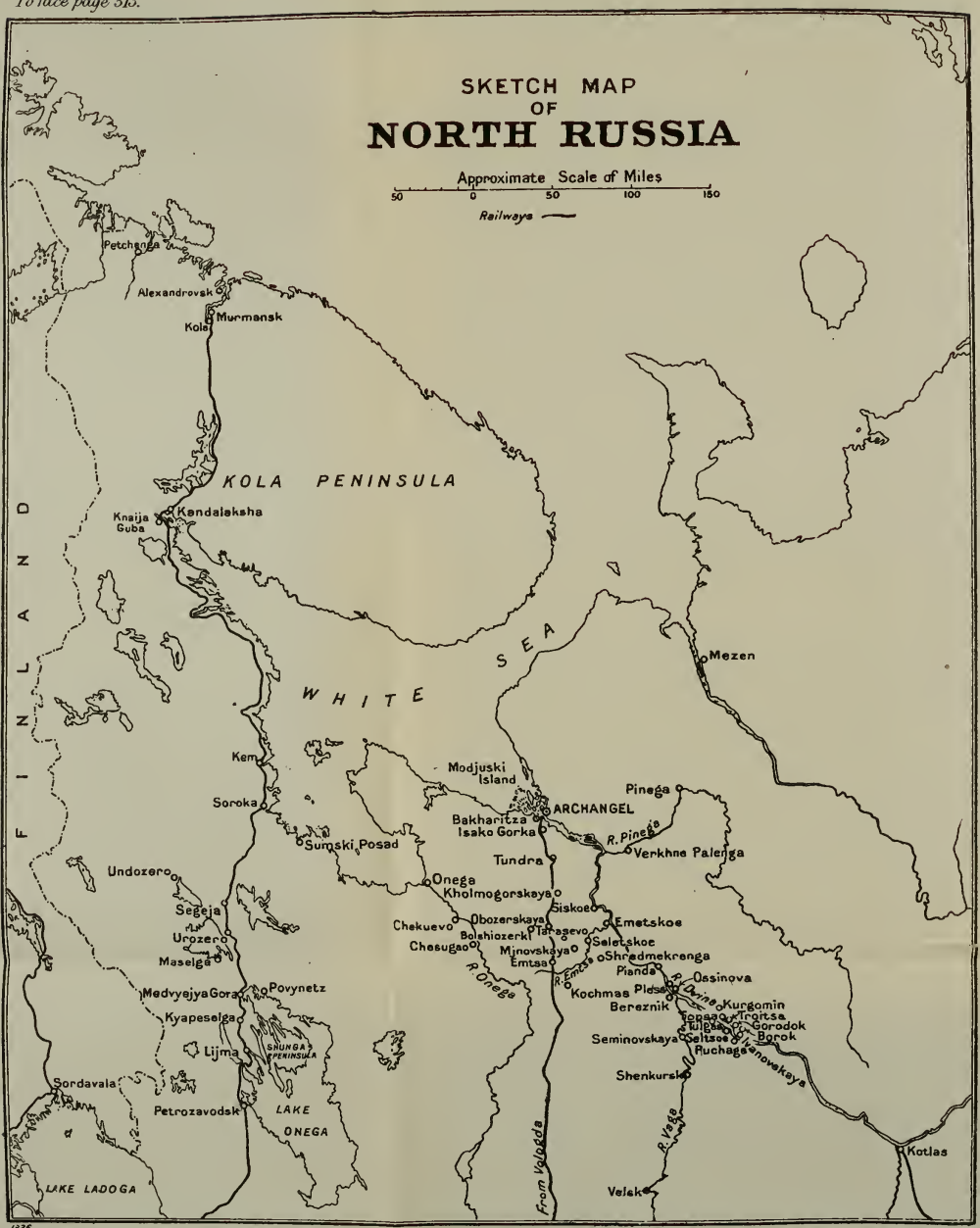
THE campaign in North Russia was in the first instance part of the operations undertaken to bring about the defeat of Germany. When Russia seceded from the Allies and made a separate peace with Germany in the spring of 1918, the military situation on the Western front became extremely grave, for with the collapse of Russia the Germans commenced transferring troops from the east to the west. With the object of preventing the further transfer of German divisions to the Western front, the Allies decided to send a force to occupy Murmansk, which is the terminus of the Petrograd–Murman Railway, and the only port on the North Russian coast that remains ice-free throughout the year. The Allies at the same time desired to prevent the great quantities of military stores which had been accumulated by them in North Russia from falling into the hands of the Bolsheviks, and if possible to bring assistance to a large body of Czechs, who had been captured by the Russians during the war and were endeavouring to reach Archangel in order to join forces with the Allies.

The medical history of the campaign in North Russia is of special interest because very many years have elapsed since military operations have been undertaken by British troops in an arctic region, and although associated in the campaign with French, Italian, Serbian, American and "loyal" Russian detachments, the British was the only force with an organized medical service.

The original force consisted of 150 marines who landed at Murmansk in April 1918; these were followed by 370 more at the end of May, and further reinforced by 600 infantry and machine-gunners on 23rd June. From then onwards demands for reinforcements were unceasing, and the force steadily increased until the British troops numbered 18,400.

This demonstrates the truth of Sir Henry Wilson's dictum that "once a military force is involved in operations on land, it is almost impossible to limit the magnitude of its commitments." It naturally follows that the responsible medical officer on the spot must always be prepared for an extension of the original force, and must be continually reconsidering the medical requirements of the force and the system of evacuating

To face page 513.



4326.

Malby & Sons Lith.

its sick and wounded. As a result of the rapid expansion of the medical units that was necessary to meet the growing needs of the force during the campaign, medical personnel had frequently to be employed on work not usually associated with the medical service, such as the construction of hospital buildings and sanitary appliances, which interfered with their regular medical duties. As the British Medical Service developed, it received and treated, in addition to the sick and wounded of the numerous allied contingents, many thousands of the Russian population in the areas occupied. Towards the end of the campaign an endeavour was made to instal a stable Russian force and government in North Russia, and the task of organizing and training an effective Russian medical service was undertaken by officers of the Royal Army Medical Corps.

The majority of the British troops originally sent to North Russia were new troops, or men who had fought on other fronts. They were for the most part men of low physical category. Before the final evacuation of the force these troops were relieved by volunteers, who had to undertake offensive operations to cover the withdrawal.

When Major-General F. C. Poole, Commander-in-Chief of the Allied Forces in Northern Russia, arrived at Murmansk on 24th May 1918, the allied forces were holding the Kola Peninsula and had detachments at Kandalaksha. The troops at his disposal consisted of landing parties of about 500 men from allied warships ; a detachment of 300 French, mostly invalids, scattered along the railway line ; about 1,400 Serbians, of whom many were sick and half had no rifles ; the Russian " Red " Railway Guards, about 1,200, who were stationed at various posts along the line, and whose attitude towards the Allies was very doubtful ; about 500 Finnish " Red " Guards, 200 of whom were suffering from scurvy and starvation ; and any Russians he might be able to enlist. An endeavour was made to raise recruits from amongst the loyal Russians, but without much success. A " Slavo-British Allied Legion " for Russians was organized, and a special officers' company was formed, which at a later date was a valuable cadre for supplying officers for the Russian Army.

Kem was occupied in June and on the 23rd of that month the troops of two expeditionary forces, one to be based on Murmansk, and the other on Archangel, arrived at Murmansk. They were designated respectively the " Syren " and the " Elope " force. The " Syren " force was under the command

of Major-General Maynard, and this small force of one infantry company, one machine-gun company, and one company of Royal Engineers, was detailed to remain at Murmansk. The "Elope" Force, consisting of a staff and instructors under Brig.-General Finlayson, was destined to accompany General Poole to Archangel, which was to be the main base of operations. At this time the Murman Soviet Administration declared itself pro-Ally, broke off its relations with the Central Government in Moscow, and decided to defend Murmansk against the Germans, inviting the Allies to co-operate with them.

A French battalion arrived at Murmansk on 26th July, and General Poole, by arming every possible officer and man of the "Elope" Force, and with the addition of the French battalion and details borrowed from the "Syren" Force, formed a force of 1,500 strong for the occupation of Archangel. At the same time a small force of Serbians and Russians under the command of Colonel Thornhill was ordered to proceed to Onega, and thence by road to Obozerskaya, on the Vologda Railway, with instructions to cut the railway line and so prevent the evacuation of rolling-stock southwards. This force, however, failed to reach its destination.

Archangel was entered in the beginning of August 1918. The Bolshevik Government there had also been overthrown. The new government declared itself anti-German and refused to recognize the Treaty of Brest-Litovsk. The "Red" forces retired southwards, and the Allied troops were immediately organized into two forces, the Vologda Force and the Dvina Force. The former occupied Obozerskaya on 4th September, after encountering determined opposition. The enemy forces occupied well-prepared defensive positions. They were superior in numbers and officered by Germans. The country consisted almost entirely of forest and bog, which rendered any turning movement difficult and slow. Onega was occupied by a small force of Americans and by the Slavo-British Legion under Lieut.-Colonel Clarke, who cleared the enemy from the area between Onega and Obozerskaya. At the same time the overland telegraph line linking Archangel, Onega and Soroka was restored.

The Dvina Force was equipped and dispatched under very great difficulties. Ships were scarce, and those available were flimsy and unable to stand the discharge of the guns. The force was a mixed one and was originally under the command of a French officer, until he was wounded and a British officer

took command. The force established itself at Bereznik, at the confluence of the Rivers Dvina and Vaga. The enemy was routed and retired in disorder to Kotlas.

Details concerning the sanitary arrangements during the campaign in North Russia are given in the chapters in the volumes on the " Hygiene of the War " dealing with the water supply, conservancy, housing, clothing and rations of the troops. Attention will therefore be confined here to an account of the medical arrangements, the problems of medical strategy and tactics, and the diseases that affected the troops.

When the two forces, " Syren " and " Elope " embarked on the 16th June 1918 for North Russia, the medical units that accompanied them were the following :—A detention hospital of 24 beds and No. 127 Sanitary Section, attached to the " Syren " Force ; and No. 53 Stationary Hospital, equipped for 200 beds with 100 in reserve, 1 X-ray outfit, 1 pathological outfit, 1 dental outfit, and No. 125 Sanitary Section attached to the " Elope " Force. Lieut.-Colonel T. McDermott was appointed A.D.M.S. to the " Elope " Force, while Captain J. J. Roche was detailed as D.A.D.M.S. to the " Syren " Force.

During the voyage there was an epidemic of influenza on board, and the medical stores of the " Syren " Force became depleted. The troops were inoculated during the voyage against cholera and other diseases. On arrival at Murmansk it was evident that the medical arrangements of the " Syren " Force were insufficient, and medical personnel was temporarily transferred from the " Elope " to the " Syren " Force. A camp was opened on a hill to the south of Murmansk, and a camp hospital was established in it. No. 1 Detention Hospital (twelve beds) was established in Murmansk, and No. 2 Detention Hospital was sent by boat to Petchenga. One medical officer with two other ranks proceeded with the troops to Kandalaksha. At Murmansk No. 127 Sanitary Section attended to the sanitation of the ships and quayside, while No. 125 Sanitary Section supervised the outlying areas. On 4th July a French hospital which had recently arrived from the Caucasus, hampered by lack of personnel and material, sailed for England, leaving all available equipment with the local French hospital. A twenty-bedded hospital was opened at Kola. At Kandalaksha there were French and Serbian detention hospitals both in railway carriages, the medical charge of the troops in this area being in the hands of an officer of the French Medical Service. At Kem there was a small

Russian Red Cross Hospital with one nursing sister. The British, French and Serbian troops here were quartered in railway trucks, and there were Karelian and Russian detachments, each of about 200 men, billeted in the town. Two large railway trucks were fitted up as a detention hospital, one for the British and French and one for the Serbian and other troops. Towards the end of July word was received that reinforcements of medical units were proceeding to North Russia. Lieut.-Colonel E. L. Moss was appointed A.D.M.S. to the "Syren" Force and arrived at Murmansk on 7th September.

Prior to the signing of the armistice on 11th November 1918, the aim of the North Russian "Syren" Expeditionary Force was to defend the ice-free Murman coast and the Petrograd Murmansk railway. Finland was then dominated by the Germans, and the allied front coincided roughly with the Finnish border, while the main lines of communication ran parallel to it. After the declaration of the armistice and the withdrawal of German troops from Finland, the operations were directed against the hostile Bolsheviks.

The area was scantily populated, the inhabitants belonging to three races, Russians, Karelians and Lapps. The Russians occupied Petchenga on the Murman coast, Kola, Kandalaksha Kem and Soroka on the railway line, and villages to the south and along the White Sea coast. The Karelians were scattered throughout the area adjoining the Finnish border. The Lapps, a nomadic race, inhabited the area known as Russian Lapland, the greater part of which lies north of Kandalaksha. Apart from the main railway, means of transit were poor as there were few good roads. The climate is very cold in winter, but owing to the influence of the warm currents of the Gulf Stream along the shores of the Murman coast, the port of Murmansk was never ice-bound. The country consisted of bogs, forests, rivers, lakes and wide swamps. The disposition of medical units in this area followed the simple plan of establishing post hospitals at all points along the main railway where troops were assembled.

With the arrival of an official A.D.M.S. and more medical units, reorganization of the medical arrangements took place. No. 86 General Hospital was opened in Murmansk, and No. 84 Casualty Clearing Station proceeded to Kem and established a hospital on Popoff Island. No. 154 Field Ambulance was divided up, one section remaining in Murmansk attached to H.M. Hospital Ship "Braemar Castle" for duty, the second

proceeding to Kandalaksha and the third to Soroka. No. 132 Sanitary Section established its headquarters at Kem, near the casualty clearing station, and this unit became responsible for the supervision of the area between Kandalaksha and Soroka, which are separated by a distance of about 250 miles.

In view of the nature of the operations to be undertaken by the "Syren" Force, it was necessary to organize a number of mobile columns, and these were formed after a period of careful training. Major Sir Ernest Shackleton was appointed director of equipment, winter clothing, rations* and transport for the mobile columns, and he was responsible for the training of the personnel in the packing of sledges, and the making and breaking of camp, under winter conditions and in bad light. He inspected the columns to ensure that equipment was being used to the best advantage and that satisfactory transport arrangements had been made. Commander V. Campbell, R.N., was appointed chief instructor for the mobile columns in the use of skis and snowshoes. Both these officers worked in close touch with the General and Administrative Staffs of the "Syren" Force.

Italian soldiers using skis and snow goggles, North Russia.

Mobile medical units were formed by the medical service to accompany the mobile columns and to arrange for the evacuation of the sick and wounded. This was a unique experience for the medical service, and as there is no precedent for the formation of such columns in the annals of the British Army the scheme which was adopted and proved satisfactory is given here in detail. Thirteen mobile sections and seven R.A.M.C. units were formed, the A.D.M.S. being responsible

* A special concentrated ration of high caloric value was prepared and issued to mobile columns. (*See* Hygiene of the War, Vol. II., pp. 78–80.)

for the organization of the medical units. The establishments for each mobile section and R.A.M.C. unit are shown in Appendix B.

The R.A.M.C. personnel of a mobile column medical unit consisted of one officer and four other ranks. The personnel was carefully selected from men fit to undergo periods of hardship and capable of adapting themselves to any novel situation that might arise. For training purposes each medical unit was attached to a mobile column, and during that period was under the command of the officer commanding the mobile columns while the medical officer held a position similar to that of a regimental medical officer. During the period of training the medical officer and his personnel had medical charge of the column, attending to the sick and supervising the sanitation. They had no other duties, and were thus free to take part in the general training in the use of skis, in sledge-packing, sledging and camp discipline. Instructing the men of the mobile column in first aid was a highly important part of the medical officer's duties. Three men in each squad were detailed as stretcher-bearers, and were trained until they became proficient in first aid, and in the prevention, recognition and treatment of frostbite. In addition, lectures were delivered to the personnel on the use of the first field dressing and on the means of preventing frostbite, and in the following memorandum a list of hints and precautions to be observed during winter operations was printed and circulated.

HINTS AND PRECAUTIONS FOR WINTER CAMPS AND SLEDGING OPERATIONS.

A.—Medical.

1. Avoid constipation. It is essential that men should go to the latrines every day. When sledging, non-commissioned officers should report to their Commanding Officers that this duty has been fulfilled. It is as simple to attend to both functions under Arctic conditions as under ordinary circumstances.

2. Don't eat snow on the march; the lips become cracked. There is danger of frostbitten fingers, the thirst is not quenched, but the body heat is greatly reduced, as so many heat units have to be utilized to melt the small amount of snow. This should be made a disciplinary order.

3. Forbid the chewing of tobacco on the march; it uses up the saliva. Chewing gum can be substituted.

4. Frostbite on the face. Cover the affected part with the bare hand for a few moments; directly the white appearance leaves, the frostbite is cured. The first symptom of frostbite on the face or ears often feels like a wasp sting, but sometimes the affected person is not aware of it; therefore, on the march, men should watch each others' faces. Frostbite shows as a white blotch. Never try to cure it by rubbing with snow; it is also useless to apply oil or ointments.

5. To avoid frostbitten feet, the boots must not be too tight. Retardation of free circulation is a fruitful cause of frostbite. Always change socks at night; the socks worn during the day can then be put inside the clothing,

next to the chest, or hung up and allowed to freeze. The foot soon warms up on the march, even though the socks be put on frozen. The foot-gear should be changed directly men come to camp, and the night foot-gear should be changed immediately before breakfast.

6. Frostbite is more difficult to detect on the feet, as often they gradually become numb. Any man feeling loss of sensation should report immediately and fall out for medical attention. This will only take a few minutes and will not interfere with the progress of the main party; but if not attended to would mean the absolute uselessness of the man.

7. Never touch bare metal with the fingers. Frostbitten fingers means inefficiency.

8. When taking food, the spoon should always be held in the hot food or liquid before conveying to the lips.

9. When marching, always breathe through the nose and keep the mouth tightly shut. Breathing is naturally easier in cold climates.

10. Chafe between the thighs is very common in sledging. This should be treated successfully in its earliest stages by lanoline ointment or powder as the Medical Officer directs. After incomplete micturition, the dribbling of urine down the legs, due to haste, is a frequent cause of chafe. When micturiting, the clothing should be properly opened; there is no danger in this and it gives complete freedom for the operation.

11. There should be no constriction of the circulation in any part of the body or extremities by belts or wrist bands. All clothing should be secured by webbing.

12. The leaders of trains should always wear goggles (snow) when on the march. Dull days are just as liable to produce snow blindness as bright days. It is not so vital for the men following the leaders, because they have the dark clothing of the men ahead to ease their eyes. Snow blindness can only be treated by the Medical Officer.

13. Shaving should be avoided, but the beard and moustache should be kept short with clippers, as icicles will form on untrimmed beards from the moisture of the breath.

B.—General Sledging.

1. Don't lay any tools or weapons on soft snow; they disappear immediately.

2. Don't leave picks or shovels lying on the snow at night; always stick them upright or place securely on the sledge. The same applies to your sledging harness; it should always be placed on the sledge.

3. Silence, whilst sledging, is essential.

4. Don't carry snow into the tents on boots or clothing; always brush clean before entering.

5. Don't use shovels for clearing snow from the tents unless the snow is very thick. Always finish up by hand. Tents are often ripped by clumsy work with shovels or other sharp-edged tools.

6. Always pitch tents with their backs to the prevailing wind.

7. Don't allow sledges to run with clogged runners. The runners should be examined after each halt, especially in mild weather. The slightest clogging of the sledge increases the work enormously. Don't scrape the runners with the edge of a knife, always with the back.

8. Always watch when pulling more than one sledge in line that the following sledges are running in the tracks of the first.

9. The officer in charge should be the last man to turn in at night after the camp is pitched, in order to see that everything is secure.

10. When the special canvas-topped boots are taken off at night in very cold weather, if at all damp, they should be kept in shape whilst freezing. They will then be easily put on in the morning.

11. The senna grass should be teased out and hung up. The moisture will evaporate after freezing.

12. Matches should be carried in sealed tins, and issued weekly in small boxes.

13. The matches should be wax vestas.

14. No one should take his box of matches inside his sleeping bag; the moisture engendered in the night spoils the matches. They can always be left within reach outside the bag.

15. The non-commissioned officer in charge of the tent should, when low temperatures prevail, see that all men, before going to sleep, have their heads inside the sleeping bags. Men are apt to drop asleep with their heads outside, when warmed up by food, and awaken with their faces badly frostbitten.

Several of these notes do not apply where wood can be obtained for heating purposes.

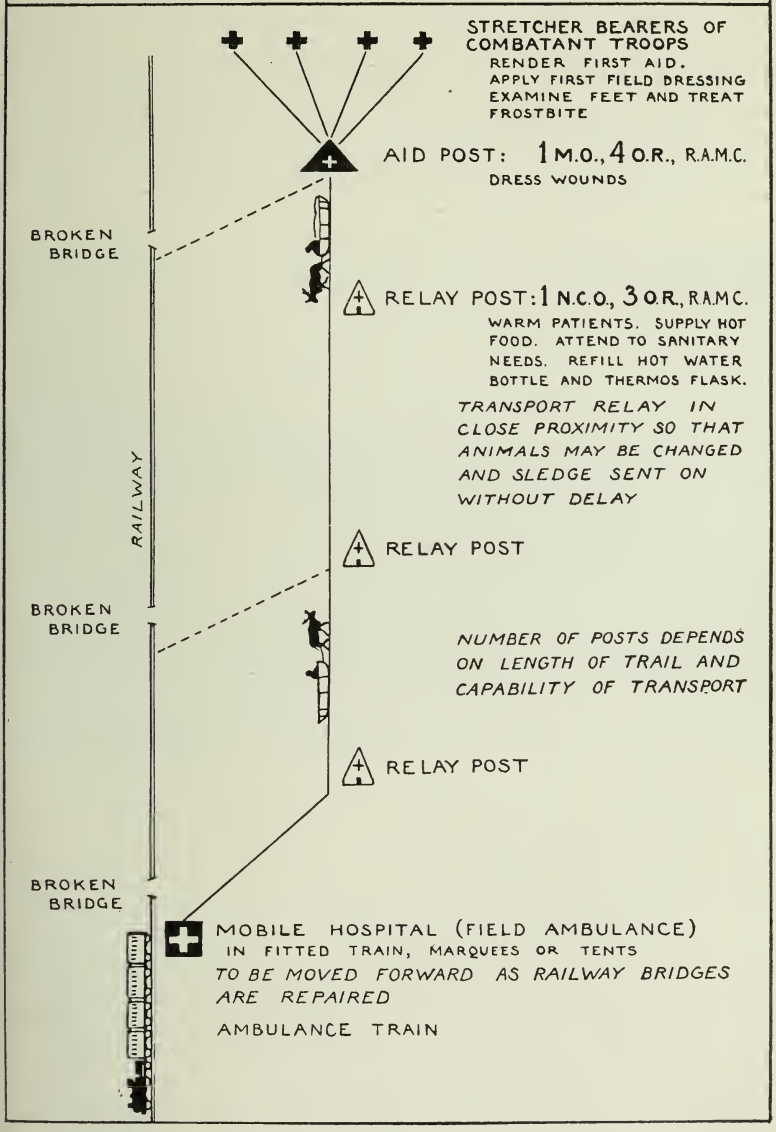
Medical officers were collected at the training centres at Murmansk and Kola, and were attached to mobile column medical units at least two weeks before the intensive training of the column commenced. During this period they received instruction from the medical officer in charge of the mobile columns in the general scheme of work and the evacuation of wounded. After this preliminary training the medical officers with their R.A.M.C. personnel were attached to the mobile columns and acted as instructors to their own men.

The evacuation of sick and wounded from the mobile column medical unit was carried out by means of a system of relay posts. Each relay system was composed nominally of three relay units, each self-dependent and capable of forming a relay post. The number of relay units in one system could, however, be increased by reinforcements from another system. The relay unit personnel consisted of one N.C.O. and three other ranks R.A.M.C. Each unit was sufficiently mobile to follow up the trail of an advancing column to a selected position and there to function as a relay post. The function of a relay post varied according to circumstances. It might be merely a post where dressings were renewed and warm food given to the wounded on their way to the advanced dressing station. On the other hand, it had to be capable of expansion into a resuscitation post where a severely wounded man could be detained and treated until fit to continue the journey.

The relay post was always established in a sheltered spot, if possible in close proximity to a supply dump, and near the transport relay post where fresh animals were obtainable. As a rule three relay units accompanied each mobile column, each halting when it had reached its prescribed position, the distance between the posts being from ten to twenty miles. The number of relay posts consequently depended on the length of the trail and the amount of transport available.

The number of personnel, the equipment and the type of transport of a mobile column varied according to the condition of the route to be traversed, the existence or non-existence of tracks and villages, and the local supply of sledges. The

DIAGRAM SHOWING THE MEDICAL ARRANGEMENTS FOR THE EVACUATION OF WOUNDED FROM A MOBILE COLUMN


STRETCHER BEARERS OF COMBATANT TROOPS
RENDER FIRST AID.
APPLY FIRST FIELD DRESSING
EXAMINE FEET AND TREAT FROSTBITE
AID POST: 1 M.O., 4 O.R., R.A.M.C.
DRESS WOUNDS
BROKEN BRIDGE
RELAY POST: 1 N.C.O., 3 O.R., R.A.M.C.
WARM PATIENTS. SUPPLY HOT FOOD. ATTEND TO SANITARY NEEDS. REFILL HOT WATER BOTTLE AND THERMOS FLASK.
TRANSPORT RELAY IN CLOSE PROXIMITY SO THAT ANIMALS MAY BE CHANGED AND SLEDGE SENT ON WITHOUT DELAY
RAILWAY
RELAY POST
BROKEN BRIDGE
NUMBER OF POSTS DEPENDS ON LENGTH OF TRAIL AND CAPABILITY OF TRANSPORT
RELAY POST
BROKEN BRIDGE
MOBILE HOSPITAL (FIELD AMBULANCE)
IN FITTED TRAIN, MARQUEES OR TENTS
TO BE MOVED FORWARD AS RAILWAY BRIDGES ARE REPAIRED
AMBULANCE TRAIN

travelling surface in the snow-bound regions varied as greatly as the road surfaces in more temperate regions, and no single set of equipment or type of transport would satisfactorily meet all requirements. Hard tracks which had been formed by constant usage presented the best travelling surface, varying according to the type of transport by which they had been brought into being. Tracks that had been so formed and then abandoned were unsatisfactory, as the hard surface became covered with snow, frequently forming drifts. Fresh trails had sometimes to be made through "unbroken" country, where frozen lakes and rivers had to be crossed, covered with

A reindeer convoy returning to Murmansk after a 400-mile journey from Kandalaksha.

varying depths of snow. When a lake was of large extent and exposed to strong winds, the loose snow was often blown aside so that a good surface resulted, especially in extreme cold. The sea-ice varied in the same way; in some places the surface was smooth and hard, while in others ridges or soft snow were encountered. Tundra or marshy ground afforded an insecure foothold and presented a bad travelling surface; while in wooded country the snow was packed loosely in the shelter of the trees and progress was often hindered by fallen branches, stumps and roots of trees.

The presence of villages on the route of the mobile column simplified requirements, as the men could be billeted in the villages, and horses and sledges were often available. Under

such conditions a certain amount of equipment, tents, sledges and transport could be dispensed with. Villages were usually connected by tracks, so that greater distances could be covered daily than in unpopulous, trackless areas, and by enlisting the services of civilians the number of personnel could be decreased. On the other hand, where sections were operating in barren, uninhabited areas, devoid of tracks or local supplies of transport, the units had to be self-dependent. The travelling surface was often so bad that the distance covered daily was relatively small, and this entailed more equipment, more transport and more personnel.

Relay post, North Russia. Water supply arrangement in foreground. Convoy of sick arriving.

In certain areas local supplies of sledges and transport were obtainable. In the scantily populated areas of Lapland the reindeer was chiefly used, while in the more populous areas pony sledges were employed. Dogs were not used locally.*

A large assortment of medical equipment could not be carried by the mobile medical units, and only such equipment as was generally useful and would meet several requirements was taken.† Thomas's thigh splints were always included. Ward

* See Chapter XXIII. for a description of the different forms of transport that were employed.

† The medical equipment of the mobile column medical unit and the relay post is shown in detail in Appendix B.

equipment, such as urine bottle, bed-pan, cleansing apparatus, and anti-fouling apparatus, such as waterproof or jaconet, or soakage pad, were essentials. The food carried was of a kind easily prepared and suitable for sick and wounded, and the feeding utensils consisted of feeding cups, pannikins and spoons. To avoid unnecessary man-handling, the sledges were arranged for stretchers of approximately the same size as the army regulation pattern, and an arrangement was also made to prevent an unconscious or helpless man from rolling off the sledge.

Pony sledge with hood, North Russia.

First aid had to be rendered quickly because the cold rapidly benumbed a devitalized man. Early skilled assistance was thus essential in view of the long route of evacuation. The medical officer with his aid post was advanced as far forward as possible, the aid post being equipped for small operations, such as the arrest of haemorrhage or setting of a compound fracture. Chloroform was sometimes required, and for its effective use the temperature had to be raised to about 70° F. Many of the wounded required anti-shock treatment, where warmth is essential. For this purpose hot drinks were given and

hot-water bottles applied. At the same time, clothing and sleeping bags were kept in good condition in order to prevent loss of heat.

The general scheme of evacuation provided both for the wounded of the fighting units and for men who fell out on the line of march. The wounded man was attended to on the spot by the unit stretcher-bearers and conveyed to the aid post as rapidly as possible. When there were several wounded, the medical officer was notified at the earliest possible moment, so that he might, if necessary, send out medical sledges for their conveyance to the aid post. The aid post usually consisted of a specially adapted tent or village hut, sufficiently

Another type of pony sledge, North Russia.

commodious for the retention of a number of cases when necessary. Casualties were evacuated from the aid post with the least possible delay, the medical sledges always being ready to start off at a moment's notice. The sledges were specially adapted and equipped to meet the needs of the wounded man, and the transport was the most rapid form available. All severely wounded cases were accompanied by a R.A.M.C. orderly, who was relieved at the end of each stage and returned to his original post. When a man fell out on the trail, a stretcher-bearer was detailed to take charge of the patient until he was handed over to the medical personnel of the column. The R.A.M.C. personnel followed in the rear of the column with the ambulance sledges, the number of these depending on the size of the column and the estimated number of casualties. The medical officer

examined all cases and decided which required evacuation, and the cases were handed over to the relay posts as soon as these were established along the route. When several mobile columns were proceeding to a point by different routes, relay posts had to be opened on each route, but when the objective had been gained only the relay posts on the shortest route were retained. It was found more satisfactory to evacuate cases in convoys, as larger numbers of wounded could be evacuated in this way in the shortest possible time.

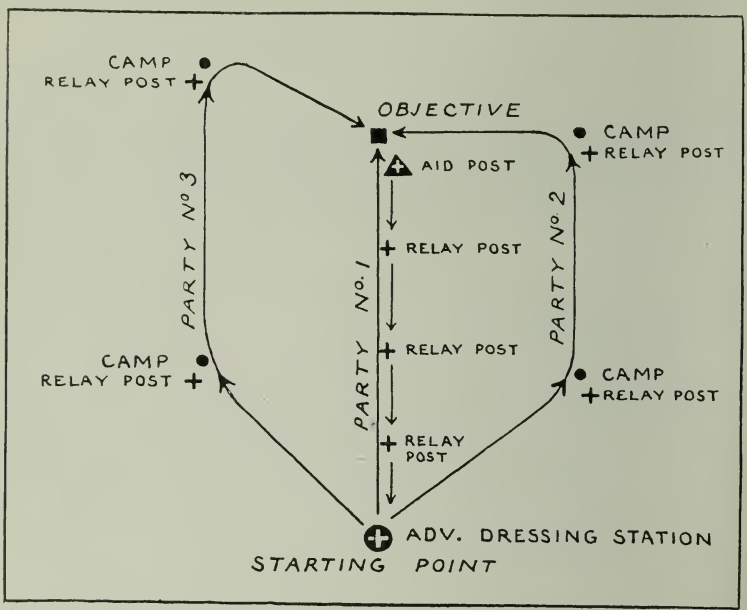


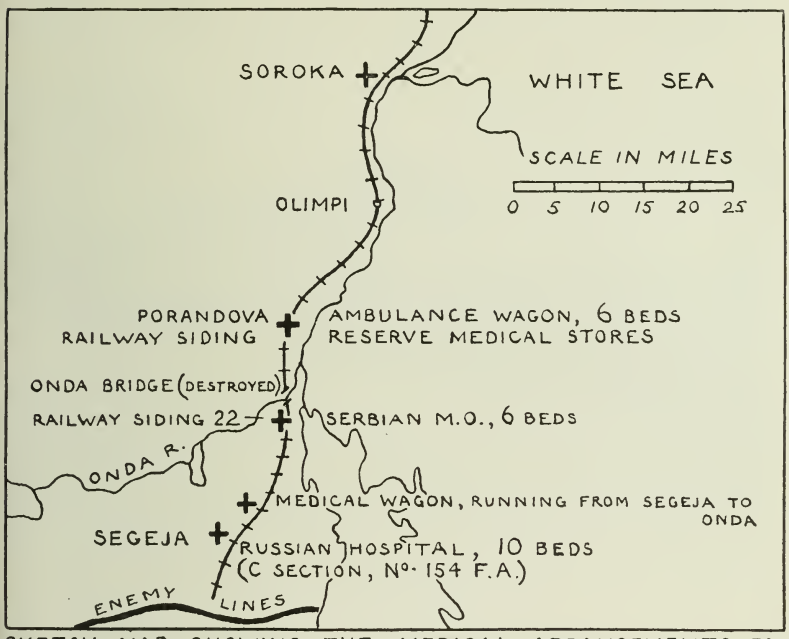
DIAGRAM ILLUSTRATING THE SHORTEST ROUTE OF EVACUATION AFTER AN OBJECTIVE HAD BEEN GAINED

The advanced dressing station was formed by a field ambulance, and was situated on the railway or within easy reach. Its position was never altered in the course of operations, unless information regarding its new position could be definitely conveyed to the troops. On the arrival of the convoy at the advanced dressing station, the sledges were returned immediately to the relay or aid post, carrying stores if required.

During the winter of 1918–19 the number of wounded never exceeded 15 per cent. of the number of troops engaged, and the number of sick averaged two to three times the number of wounded. The chief causes of sickness were frostbite and exhaustion, the latter being either pyrexial or apyrexial in type.

The operations in the Murmansk area resulted in the capture, on 20th February 1919, of Segeja, a town 60 miles south of Soroka. The medical arrangements for the advance are shown in the sketch map. The Russian enemy troops were driven south of Segeja, and the Soroka–Onega route was cleared, thus ensuring communication by land with Archangel.

During the winter of 1918–19 Archangel was connected with Murmansk by a long and lonely track across the snow, which could be traversed by reindeer sledge but was useless for the



SKETCH MAP SHOWING THE MEDICAL ARRANGEMENTS FOR THE ADVANCE ON SEGEJA

transfer of any large body of troops. The two commands were therefore distinct. Major-General Sir W. E. Ironside took over command of the allied forces at Archangel in October 1918. The troops then available consisted of 14,000 British, French, American, Italian and Polish; 1,500 Russian, consisting largely of returned prisoners of war; and the Slavo-British Legion numbering 3,000, composed of refugees of all nationalities. General Ironside's first consideration, in view of the fact that the Archangel force would be practically isolated during the winter months, was to consolidate his position, to increase the Russian forces, and to stock the food,

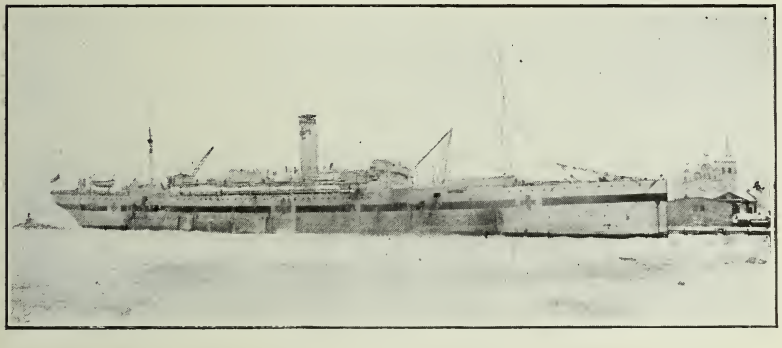
ammunition and clothing depôts at Archangel. The port began to freeze up in the first week of November, and when the armistice was declared it was too late to withdraw the troops. Meanwhile, the enemy forces increased rapidly in strength and organization. As a result of their increased activity in the neighbourhood of Archangel, considerable reinforcements had to be dispatched both from the Murmansk area and from the United Kingdom, and amongst the personnel most urgently required were R.A.M.C. reinforcements.

During the winter the enemy forces attempted to drive the Allies out of Archangel. As their attempts gradually

Sledges used for evacuating wounded during the fighting at Segeja, North Russia.

became more formidable, General Ironside's troops were reinforced by 2,000 men sent from Soroka by land on local sleighs, by a route which covered some 400 miles. The Bolshevik offensive operations may be divided into four phases: The Dvina river offensive, from 4th October to 15th November 1918; the Shenkursk offensive, from 19th January to 10th March 1919, launched against Russian and American troops who had advanced to Shenkursk, a town in North Russia second in importance to Archangel itself; the attempted offensive to cut off the Dvina force, from 25th January to 5th April 1919, when the allied forces were compelled to evacuate Tarasevo; and the Vologda railway offensive, from 16th March to 18th April 1919.

Lieut.-Colonel T. McDermott, the original A.D.M.S. of the " Elope " Force, was succeeded by Colonel A. E. C. Keble, who arrived at Archangel on 26th August 1918 and became D.D.M.S. of the Force. Colonel Keble only remained at Archangel until 1st September, when he left for England. Lieut.-Colonel McDermott officiated until the arrival of Colonel R. J. Blackham on 1st December ; the latter, however, was evacuated sick on 27th December, and Lieut.-Colonel McDermott again acted as D.D.M.S. until the arrival of Colonel G. St. C. Thom on 5th February 1919. On the 18th April the designation " D.D.M.S. North Russian Expeditionary Force " was altered to " D.D.M.S. Allied Forces, Archangel," an important change



H.S. " Kalyan " ice-bound at Archangel.

which indicates that from that date onwards the medical personnel of the allied forces accepted officially the administrative control of the British D.D.M.S.

When Colonel Blackham became D.D.M.S. of the Archangel force in December 1918, the force had a total strength of just under a division and contained barely a brigade of British troops. The force was based on Archangel, and, as already noted, its two main fighting formations were operating up the River Dvina and along the railway towards Vologda. The headquarters of the Dvina force were at Bereznik, and the force consisted of the " Dvina Column " and the " Vaga Column," radiating from Bereznik along the River Dvina for 80 miles and along the River Vaga for 75 miles respectively. The Vologda Force had its headquarters at Obozerskaya and was divided into three columns, one operating southwards along the railway for 92 miles from Archangel in the direction of Vologda, the

second operating on the River Onega to Onega, 90 miles south-west of Archangel, and the third based on Seletskoe and operating in the area between the railway and the River Dvina. The railhead was at Obozerskaya, 80 miles distant from Archangel. There was also a small force on the lines of communication holding Pinega, 90 miles east of Archangel.

The population of Archangel was normally about 35,000, but at this date there was a population of 120,000. It was a long, straggling town extending from north to south about 5 miles, the extreme limits of the town being connected by an electric tramway.

Hospital at Seletskoe, with sick convoy in foreground.

The medical organization of the force was as follows : At the base were No. 53 Stationary Hospital, which was established in a Russian monastery at Smolny, a southern suburb of Archangel, and which was equipped for 550 beds ; the H.S. " Kalyan " (756 beds) ; an American hospital equipped for 35 beds, and an American Red Cross Hospital for 78 beds ; No. 125 Sanitary Section and No. 16 Base Depôt of Medical Stores ; a section of No. 337 American Field Ambulance ; and No. 85 General Hospital, which was to be installed in the new Russian naval headquarters at Solombola, a northern suburb of Archangel, when this building had been completed. Infectious cases were treated in an annexe of the stationary hospital.

No. 82 Casualty Clearing Station (200 beds) was stationed on the lines of communication at Bakharitza, being accommodated in three blocks of the Russian port hospital and in four large barrack huts. This hospital was over an hour's journey from Archangel by sledge. There was a detention hospital of 50 beds at Emetskoe and another of 25 beds at Pinega. Medical detachments, usually consisting of one medical officer and two or three other ranks R.A.M.C., were posted at Isako Gorka, Tundra, Kholmogorskaya and Siskoe.

An improvised ambulance train with 100 beds, and a combined disinfection and bath train were stationed at Obozerskaya.

Aid post on the Obozerskaya–Seletskoe road, March 1919.

The S.M.O., Vologda Force, was stationed at Obozerskaya, where there was a detention hospital of 50 beds. Other detention hospitals had been opened at Chekuevo (10 beds), Onega (40 beds), and Seletskoe (50 beds). In advance of Seletskoe there were two aid posts stationed at Shredmekrenga and Mjnovskaya.

With the Dvina Column 6 detention hospitals with accommodation varying from 5 to 25 beds were opened, while an improvised hospital ship, the "Courier" (40 beds) was available. With the headquarters of the Dvina Force at Bereznik were "A" Section of No. 337 American Field Ambulance, equipped for 100 beds, and the hospital barge "Michigan" equipped for 25 beds.

The medical units attached to the Vaga Column were American, the S.M.O. belonging to the U.S. Medical Service.

No. 337 American Field Hospital, equipped for 100 beds, was stationed at Shenkursk, and in addition three small detention hospitals were opened.

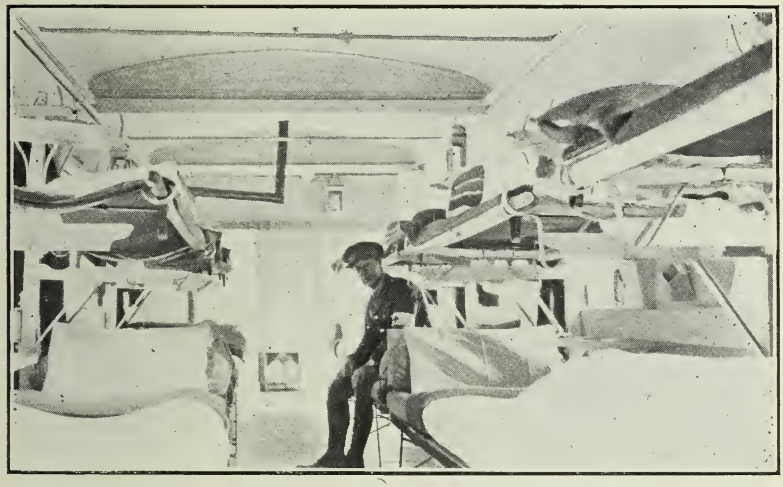
During the winter, when the rivers were frozen and the ground covered with snow, the evacuation of the sick and wounded from the forward areas was carried out by means of sledges, except in the neighbourhood of the main railway line. As a rule the sledges travelled in convoys, generally following the course of the rivers. At intervals of 15 to 20 miles along the route relay stations were opened. As an example of the time taken to evacuate cases, the journey from Bereznik to Archangel

Transferring casualties to a hospital train, North Russia.

occupied from three to five days, depending largely on the weather.

With regard to the nursing arrangements of the force, there was a British nursing staff on board H.M. Hospital Ship "Kalyan." Miss Hartigan, the matron of the hospital ship, was appointed Acting Principal Matron to the force. Russian nursing sisters were employed at No. 53 Stationary Hospital, but the majority of them could only speak Russian. They were paid at the rate of 300 roubles per month and were provided with rations and billets. The consulting surgeon spoke highly of their nursing abilities in surgical cases, but owing to their ignorance of English they were not suitable for nursing medical cases.

During the greater part of the winter the country is a vast, silent, featureless, snow-clad pine forest. In mid-winter there are only a few hours of daylight and little direct sunshine. Locomotion is very largely by sledge and consequently almost noiseless. Train services are infrequent and very slow; the Russians themselves are extremely unpunctual and are never in a hurry. Taken singly, these points may seem trivial, but collectively they had a depressing effect on the spirits of the British soldier, accustomed as he was to the ceaseless bustle and activity of modern British life, with its constantly varying conditions of climate, scenery and surroundings. Isolation from



Interior of an ambulance train coach, Murmansk.

home, infrequent mails and lack of opportunity for recreation, added to the general dejection of the troops. This condition caused the medical authorities much anxiety, as it was apt to lead to neurasthenia. Colonel Thom, when he became D.D.M.S. of the force, was emphatic in advising the Headquarters staff that no British officer or man should be compelled to serve in North Russia for a longer period than twelve months, and that during this period leave home should be granted at least once.

The mental depression prevailing amongst the troops might have had more serious results.. When a special message was received from the War Office to the effect that no troops who had served in North Russia during the winter 1918–19 would be called upon to pass another winter there, but would be sent

home in time to see the corn ripen in their own country, the tired and dispirited troops threw off their lethargy and carried on with renewed vigour.

To alleviate the widespread depression of the troops a more frequent mail service was instituted, and tobogganing and skating were encouraged. An increased number of recreation huts and grounds for outdoor sports were being considered in the event of the allied troops having to pass another winter in the country. It was found that the general mental depression tended to prolong the convalescence of patients suffering from minor diseases. During the winter a high temperature of

Interior of a recreation room, North Russia.

over 70° F. had to be maintained in the hospitals, and the impossibility of sending men direct from the hospital wards to duty in a zero temperature led to an unusually long stay in hospital, and in many cases to evacuation to England. Well-equipped convalescent depôts were a necessity and would doubtless have become a feature of the medical arrangements had the troops been retained during the following winter.

The consulting physician in one of his reports drew attention to the effect of alcohol, especially whisky, on the personnel of of a force operating in an arctic region, and he suggested that the supply should be strictly limited. He pointed out that the Russians almost invariably drank their spirits undiluted and that

the other troops quickly learnt to follow their example. Owing to the gloomy and dispiriting conditions prevailing during the winter months, men addicted to excess in alcohol had little chance of resisting this temptation.

The organization and training of the Russian forces were commenced in October 1918, under the supervision of British officers. The schemes for the formation and training of a regular Russian medical service, with an adequate reserve, followed closely the arrangements of the British medical service. There were administrative officers at General Headquarters, base hospitals and base depôts of medical stores, an ambulance train and a mobile bacteriological laboratory on the lines of communication, field medical units, mobile advanced dressing stations and regimental medical units. Special attention was paid to the Russian military hygiene service, and an administrative officer and two hygiene sections were to be attached to headquarters, and one section allotted to the base. On the lines of communication there were to be two mobile disinfectors, and in the forward area another hygiene section. Plans were also made for the formation of a Russian military nursing service. Details of war establishments, and mobilization store tables, were carefully considered and R.A.M.C. officers were appointed as liaison officers and instructors. As the early withdrawal of the British troops from North Russia became certain, and the mobilization of the Russian army made steady progress, the Russians were encouraged to pay greater attention to the scheme for the formation of the new Russian medical service.

On 4th March 1919 the early evacuation of the allied troops from North Russia was considered. Whether the actual evacuation was to be carried out immediately the port of Archangel became free or later in the summer, it was essential in either case to have at hand a strong force of fresh troops to cover the withdrawal, or to meet any contingency that might arise. Consequently, the preparation of a special contingent for Archangel of about 4,000 men, to which was added later a second contingent of similar strength, was authorized. Each of these relief forces consisted of a mixed brigade of two infantry battalions, with units of Royal Artillery, Royal Engineers, Machine Gun Corps, R.A.S.C., and R.A.M.C. The first was under the command of Brig.-General G. W. St. G. Grogan, and the second under Brig.-General L. W. de V. Sadleir-Jackson. The Ministry of Shipping was asked to provide three specially strong ships to transport the units of the relief

forces, which would be able to reach Archangel at least a fortnight earlier than the ordinary shipping. The Admiralty made arrangements to dispatch a small river expedition to reinforce the flotilla on the River Dvina, and the Ministry of Shipping took steps to provide the necessary river craft, including hospital steamers and boats for the conveyance of troops and supplies.

On 26th May the first relief force under General Grogan arrived at Archangel, and was sent to relieve the troops holding the Dvina front. The second relief force arrived on 10th June, and the withdrawal of the Allied troops who had spent the winter in North Russia was then commenced.

In order to secure the safe withdrawal of the British forces offensive operations against the enemy were undertaken. The original intention was for General Ironside to attack Kotlas, but the record low-water level of the River Dvina during July immobilized the naval flotilla which was to have taken part in the operations, and upset all arrangements for the river transport of the force. The operations therefore were limited to an attack on Gorodok and Seltsoe.

During July mutiny broke out in the 3rd Company of the 1st Battalion of the Slavo-British Legion, and in the Machine-Gun Company of the 4th Northern Rifle Regiment, reserve troops on the right bank of the River Dvina. Three British officers and four Russian officers were murdered, and two British and Russian officers wounded. The 1st Battalion of the Slavo-British Legion was disarmed and sent to the lines of communication as a labour unit. Later in the month the Russian regiment stationed in the Onega district mutinied and handed over the entire Onega front to the Bolsheviks. On the Vologda front, too, the Russian troops were preparing to mutiny, but their plans were frustrated. The situation was becoming serious, and it was clear that nothing was to be gained by the British force remaining any longer at Archangel. The sole matter for consideration was how best to carry out the withdrawal of the force from the advanced positions.

While this was the position at Archangel, the Murmansk force was also preparing to withdraw. General Maynard was instructed to carry out offensive operations against Medvyejya Gora and Povynetz. Povynetz was captured on 18th May and Medvyejya Gora on 21st May, the casualties during the latter action being one British officer and two other ranks killed, and four British officers and fifteen other ranks wounded. During June, General Maynard continued to advance. The

Russian troops, however, proved disappointing, and most of the fighting continued to be done by the British artillery and two infantry companies, and the Serbian contingent. On 17th June General Maynard was instructed to limit his future operations to holding the line then occupied south of Medvyejya Gora, and at the same time to concentrate on the training of his Russian forces. He had, however, already sent troops and arms to the Shunga peninsula, and in order to secure land communication between the peninsula and the mainland he found it necessary to occupy a position south of Kyapeselga. General Maynard's aim was to gain control of all lines of approach to the Murmansk area from the south, while at the same time reducing the front to be held.

Owing to the failure of the Russian forces, the withdrawal of the allied troops both from Archangel and Murmansk became a difficult military operation, which could only be properly co-ordinated under the orders of one commander. General Lord Rawlinson was therefore appointed Commander-in-Chief of the forces in North Russia, and he sailed from the United Kingdom on 4th August 1919. In order that Lord Rawlinson might have at his disposal an adequate number of troops to carry out the operations, a force was prepared for service in North Russia consisting of three infantry battalions, one machine-gun battalion, personnel of two batteries of Royal Field Artillery, one field company of Royal Engineers, and a detachment of five tanks. Two of the battalions of Infantry, two machine-gun companies and the artillery, engineers and tanks were dispatched, while the remainder of the force were kept in readiness to embark for North Russia if required. In addition, a battalion of Royal Marines was sent to Murmansk, and the French Government agreed to send one battalion of infantry there.

On 10th August General Sadleir-Jackson's brigade, supported by Russian troops, successfully attacked the enemy's position on the River Dvina. The advance ended with the capture of Puchega and Borok, situated about 16 miles from his original position.

Lord Rawlinson arrived at Archangel on 12th August. He advised the Russian Governor-General to concentrate his most reliable troops in the Murmansk area, where they would be better able to maintain themselves permanently. The Russian Governor-General decided, however, to defend Archangel, and in order to place the Russians in as favourable a position as possible to continue their resistance throughout

the coming winter, a sufficiency of food, arms, ammunition and coal was left at Archangel, although it was stated that no further supplies of any kind could be sent from the United Kingdom.

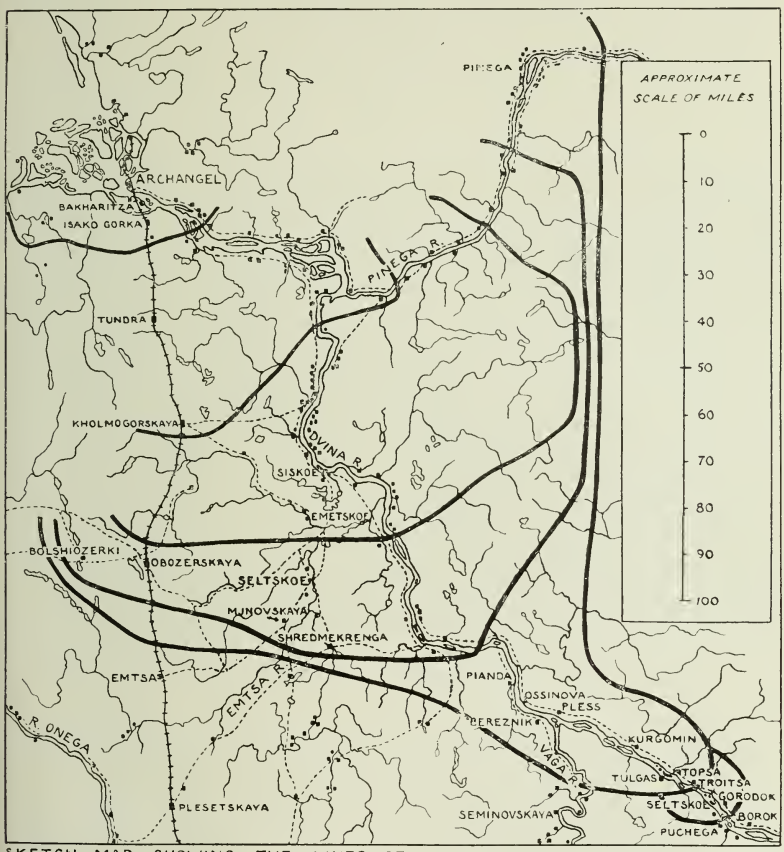
Lord Rawlinson allowed two British companies to take part in an attack at Emtsa, on the Vologda Railway, in order to improve the moral of the Russian troops. This attack was successfully carried out on 29th August. By the end of August the first echelon of the force prepared in England to assist in covering the withdrawal, and to act as a reserve in case of emergency, arrived in North Russia ; one battalion and two machine-gun companies with the tanks proceeded to Archangel and the remainder to Murmansk. By 12th September it was found that the second echelon would not be required to leave England.

The relief of the allied contingents and original British troops, which had been going on steadily since early in June, was completed at the beginning of September 1919, and the evacuation from Archangel of Russians and refugees of other nationalities was proceeded with. Altogether 6,535 were sent away, nearly all of them going to the Baltic states or South Russia.

An unsuccessful attempt was made on 1st August to recapture the town of Onega. Early in September, however, the enemy forces withdrew from the northern end of the Onega valley, and on the 10th of the month the town was occupied by an allied force without opposition. The Russian troops continued to make progress on the Vologda Railway front south of Emtsa. On the Dvina front, the enemy attacked the positions at Puchega and Ivanovskaya on 6th and 11th September. These attacks were repulsed, and General Sadleir-Jackson succeeded in disengaging his troops and retired down the river, clearing Troitsa on 12th September. The withdrawal was continued without incident, and by 23rd September the British troops had retired within the inner defences of Archangel. The various stages of the withdrawal are shown in the sketch map on page 539.

On the withdrawal of the British troops the Russians took over the line Emetskoe-Seletskoe-Obozerskaya-Bolshiozerki. This was a strong line for which good defences had been constructed. The embarkation of the British troops was accomplished without a hitch, and on 27th September the evacuation of Archangel was completed, and General Ironside with his staff sailed for the United Kingdom.

At Murmansk the shortage of administrative personnel had been causing anxiety. The situation was improved by diverting to Murmansk a considerable number of men of the R.A.S.C., R.A.O.C., and R.A.M.C., originally intended for Archangel but no longer required there owing to the acceleration of the evacuation. These, together with the fighting troops, both



SKETCH MAP SHOWING THE LINES OF WITHDRAWAL OF THE BRITISH FORCE

British and French, who had arrived in August, ensured an adequate number of allied troops to carry out the withdrawal from Murmansk.

On 14th September General Maynard began offensive operations south of Kyapeselga, at the Shunga peninsula, with a view to covering the withdrawal of the allied troops. This attack, which was carried out by British, Serbian and Russian troops, resulted in the complete defeat of the enemy and an

advance to a point several miles south of Lijma. In this and earlier operations in this region the land forces were assisted by the flotilla on Lake Onega, which had been reinforced by twelve motor boats. By 29th September Kem had been evacuated by the British, and by 4th October all British troops had retired north of Kandalaksha. The evacuation of Murmansk proceeded smoothly and was completed by 12th October 1919.

The withdrawal of the allied forces from both fronts was carried out practically without loss. The total casualties, killed, died, wounded and missing, sustained by the British forces in North Russia from the commencement of the campaign in the spring of 1918 to the final evacuation in October 1919 were 106 officers and 877 other ranks, including 41 officers and 286 other ranks killed.

During the summer of 1919 various changes took place in the medical administration of the Archangel force with a view to co-ordinating the medical arrangements for the withdrawal. At the beginning of June Lieut-Colonel T. McDermott, A.D.M.S., returned to England and Bt.-Colonel H. E. M. Douglas was appointed " A.D.M.S. Base " at Archangel, with a D.A.D.M.S. to assist him, while at the same time an A.D.M.S. and D.A.D.M.S. were appointed to both the Dvina and the Vologda Forces.

The hospital accommodation at Archangel base was then as follows :—

	Beds.
No. 85 General Hospital	520
No. 53 Stationary Hospital	433
Venereal Annexe	100
No. 82 Casualty Clearing Station	200
H.M. Hospital Ship " Kalyan "	755
	2,008

In addition, the Americans had accommodation for 250 patients, the French for 100, and the Russians for 250, making a total of 2,608 hospital beds available. This constituted the total hospital accommodation at the base for a force of 30,000, being 9 per cent. of strength. The number of sick in the base hospitals at this time was 6 per cent. of the total strength of the force. All available beds in the American, French and Russian hospitals were constantly occupied, and additional accommodation had to be provided in the British hospitals. There was a daily average of 38 other ranks American, and 4 officers and 70 other ranks Russian, occupying beds in British hospitals. No special provision

of hospital accommodation had been made by the British Navy or the Royal Air Force, and there was a sick average of four naval officers and 37 naval ratings daily. Since 6th December 1918 only 151 patients in all had been evacuated from Archangel by means of ice-breakers, and many cases who could not be so evacuated still remained in hospital or in the base depôt at the end of May. When the ice broke and the White Sea was again open to shipping, the position became easier, and on 3rd June the H.S. " Kalyan " sailed for England with a large number of patients who had been awaiting evacuation.

Interior of a surgical ward, showing heating arrangements, North Russia.

In the forward areas, hospital accommodation for 750 beds was provided in twelve detention hospitals and in hospital barges improvised locally. The hospital river paddle steamers, " Vologshanin " and " Courier," with a total capacity of ninety beds, were available early in May for the evacuation of casualties, and " Hospital Barge Unit No. 1," with normal accommodation for 250 patients, was stationed at Bereznik by 21st May.

Towards the end of May 1919 the medical units and personnel of the " Syren " Force were distributed as follows: Murmansk—No. 86 General Hospital, No. 15 Base Depôt of Medical Stores and 127 Sanitary Section; Kola—R.A.M.C. aid post with one medical officer; Kandalaksha—No. 2

Detention Hospital; Knaija Guba—British Finnish Hospital under R.A.M.C. officer; Kem—headquarters of the A.D.M.S., D.A.D.M.S. Sanitation, and No. 1 Detention Hospital; Kem Port No. 84 Casualty Clearing Station and No. 42 Advanced Depôt of Medical Stores; Kem Town—British Karelian Hospital under R.A.M.C. officer; Soroka and Segeja—R.A.M.C. aid posts; Siding 19—R.A.M.C. aid post under medical officer; Mrozero—R.A.M.C. aid post; Maselga—No. 154 Field Ambulance and No. 132 Sanitary Section; Siding 12—mobile R.A.M.C. aid post; front line—regimental aid posts under British medical officers with eighteen other ranks R.A.M.C.

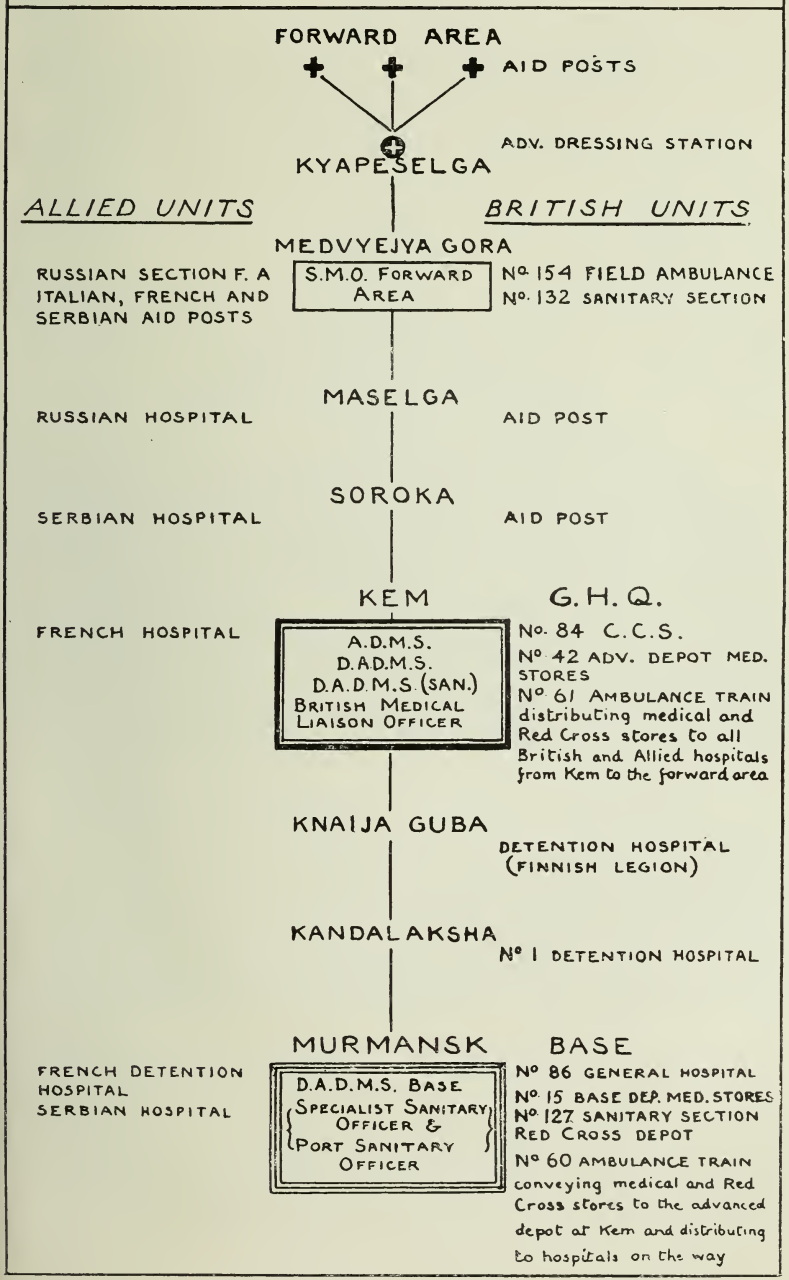
Wards for sick officers and special cases, Murmansk.

Nos. 60 and 61 Ambulance Trains were running on the Murman Railway.

The medical organization of the "Syren" Force in August 1919 is shown diagrammatically on page 543.

Some idea of the difficulties attending the work of the medical service in Murmansk may be gathered from the fact that the base hospital consisted of thirty-one scattered wooden buildings, set sufficiently far apart to prevent the spread of fire. Fires occurred on four occasions, but were extinguished each time by the R.A.M.C. fire picquets which were maintained night and day. There were over 120 stoves, consuming 6 tons of wood daily, which had to be attended to by R.A.M.C. fatigue parties. Water was distributed to the various wards in tubs on sledges, and in summer by hand carriage. This extra fatigue work, in addition to the ordinary routine work in the wards,

DIAGRAM SHOWING THE MEDICAL ORGANIZATION OF THE "SYREN" FORCE IN AUGUST, 1919.



rendered the administration of the hospital difficult, and taxed the strength of the ordinary establishment of personnel. The absence of ordinary laundry facilities was a serious drawback, but the construction of a mechanical laundry was not possible owing to shortage of labour; Nissen huts were ultimately erected and adapted as washing houses and drying rooms, and Russian washerwomen were employed.

During the period of thaw, which commenced early in April and lasted for about six weeks, the ground was unsuitable for sledges. Steamers could not be utilized on the rivers until they became free from ice, and patients had to be retained wherever they happened to be until the rivers became navigable.

Water barrel used for carrying water to units, North Russia.

This was a time of some anxiety on the river front, for the upper reaches of the rivers became ice-free sooner than the lower reaches to the north, and the enemy could thus make earlier preparations to attack. Owing to the insanitary condition of the towns and villages throughout the entire occupied area, fears were entertained of waterborne epidemics of cholera and dysentery occurring amongst the allied troops when the thaw commenced. Arrangements were therefore made in March to increase the accommodation of all the larger hospitals in the forward areas. At the same time, large supplies of medical comforts, clothing, and medical and surgical equipment were dispatched from Archangel to all hospitals and rest stations on the lines of communication and in the forward areas.

From early in February 1919 onwards sanitary appliances were constructed by No. 125 Sanitary Section and the Royal Engineers at Bakharitza, and sent by sledge to the forward

Improvised laundry in North Russia, with temperature averaging several degrees below zero.

areas. All units were thus equipped with the necessary sanitary appliances by the middle of April, when the sleigh routes could no longer be used. There is no doubt that, but for these

Military light railway laid through a heap of three years' accumulated rubbish and refuse, North Russia.

precautions, the comparatively small epidemics of diarrhœa and dysentery which occurred during July and August might have assumed more alarming proportions.

From 20th May the weather became steadily warmer, and during June, July and August the thermometer ranged between 80° and 90° F. in the shade. The nights, however, were comparatively cool. Mosquito curtains were essential, for any person living within 50 yards of the river-banks was violently attacked by mosquitoes. During the day biting flies abounded everywhere and were particularly troublesome in the forests.*

During the summer it was impossible for transport to proceed directly across country, as the areas between the rivers consisted largely of bogs or " tundras," which were impassable

Type of country carts used for evacuating sick and wounded during the summer months, North Russia.

to wheeled traffic. As a result, lateral communication was never possible between adjacent lines of communication. The lines of communication radiating from Archangel base covered altogether about 1,150 miles.

In certain local areas ordinary wheeled transport was used to convey the sick and wounded to the advanced dressing stations on the river or railway. The light-draught paddle steamers that were used for evacuating casualties down river had been specially constructed in Archangel during the winter months and had accommodation for forty cases, in addition

* A paper entitled "Notes on Blood-sucking Flies in North Russia during the summer of 1919," by Major A. D. Fraser, D.S.O., M.C., R.A.M.C., was published in the *Bulletin of Entomological Research*, December, 1920.

to the medical staff. The ambulance train in use was an improvised one, consisting of four coaches and two fish wagons. The fish wagons were unsuitable for winter use, but were latterly improved.

During the later operations of the "Syren" Force in the south, the medical services were confronted with great difficulties in transporting the sick and wounded from the front line to the main dressing station. Three days' journey over forest tracks and across lakes was not uncommon. Improvised travois made from the ubiquitous birch trees by the stretcher-bearers and drawn by mules proved invaluable, and for this reason it was found that the most important parts of a stretcher-bearer's equipment were an axe and rope for the construction of suitable travois whenever necessary.

During operations along the railway line the troops were closely followed by a railway coach converted into a mobile dressing station, which plied between the front line and the ambulance trains. An operating centre was established as far forward as possible, and in one instance, when skilled surgery was required at a post distant three days' journey through the forest, the specialist surgeon with his sterilizer and instruments was conveyed by hydroplane, alighting on the lake, and reached the patient in less than an hour's time.

In view of the impending operations on the Dvina river front, the hospital accommodation at Bereznik was considerably increased. This was necessary on account of its position on the route midway between Kotlas and Archangel. The rivers, owing to the long-continued drought, had become very low, and though the River Dvina was navigable to vessels drawing 5 ft. of water as far as Bereznik, beyond that point, owing to the numerous shallows, it was not navigable for vessels drawing 3 ft. of water. The level of the Rivers Vaga, Pinega and Emtsa sank so low that no vessel drawing more than 21 ins. could pass up them. The wounded were therefore conveyed by light-draught paddle steamers from the barges at Troitsa to Bereznik. Here a re-assortment took place, the slighter cases being disembarked and retained on shore, while the more serious cases were transferred to a heavier draught hospital steamer for evacuation to Archangel.

Large quantities of medical and surgical stores, with a reserve of personnel, were collected at Bereznik, so that there was little or no delay in providing the medical units in the most advanced areas with all that they required. In other words,

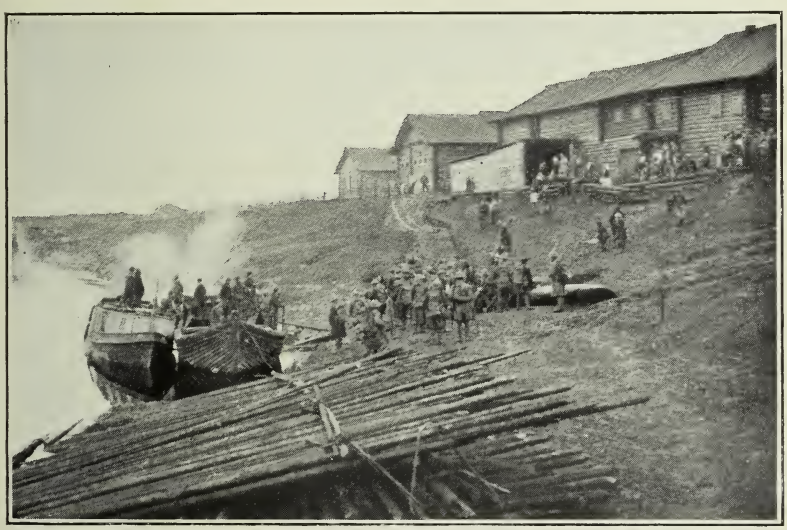
an advanced depôt of medical stores was improvised, as none had been sent from England and there was no time to arrange for one to be sent.

Late in May 1919 orders had been received that the Navy would take over all arrangements for the evacuation of patients on the Rivers Dvina and Vaga, and would assume responsibility for them until they were handed over to the military authorities at the base or to an ambulance transport for evacuation to the United Kingdom. This arrangement appeared unsatisfactory for several reasons. It was a land warfare throughout, in which the naval medical authorities had presumably little or no experience. The break in the chain of responsibility would necessitate constant communication, both in the forward areas and at the base, between the naval and military authorities. The Rivers Pinega, Emtsa and Onega were not referred to in these orders, so that the military authorities continued to be officially responsible for the evacuation of patients down these rivers, although the Pinega and Emtsa are tributaries of the Dvina. When the rivers fell too low for naval craft to be used, an added strain was thrown on the military medical authorities.

The military medical services continued to make all medical arrangements on the Dvina and Vaga fronts till 28th June 1919, when the Navy assumed responsibility for the evacuation of patients from the forward area to the base. On that date the river steamers "Vologshanin" and "Courier" and one hospital barge of one hundred beds were handed over to the naval medical authorities. Four small hospital barges, each with twenty beds and capable of expansion to one hundred beds in tents on shore, were, however, retained for use as main dressing stations. These were moored to the bank behind the troops and casualties were conveyed to them from the front line by hand carriage, in country carts, on travois, or in dry weather by motor ambulance cars. An advanced operating centre was formed in one of these barges. A hospital barge of seventy beds was also retained at Bereznik for the treatment of all patients likely to recover within ninety-six hours; this prevented wastage in fighting troops and was a saving in water transport, as otherwise such patients would have had to be sent a distance of nearly 150 miles to the base.

The hospital barges, which were an important part of the medical arrangements of the river force, had been constructed from flat-bottomed barges used locally for conveying wood down river. These barges varied in size and afforded accom-

modation for twenty to one hundred patients. Cabin accommodation was available for medical officers on board, the R.A.M.C. personnel being quartered on the lower deck. The sides of the barges were built up above the deck and roofed over. In the larger barges an operation theatre was provided which, though of somewhat primitive type, answered its purpose. The hospital barges played a useful part in the operations undertaken by the relief brigades in July and August 1919 on the River Dvina south of Bereznik and in the neighbourhood of Troitsa, which resulted in the defeat of the enemy and the

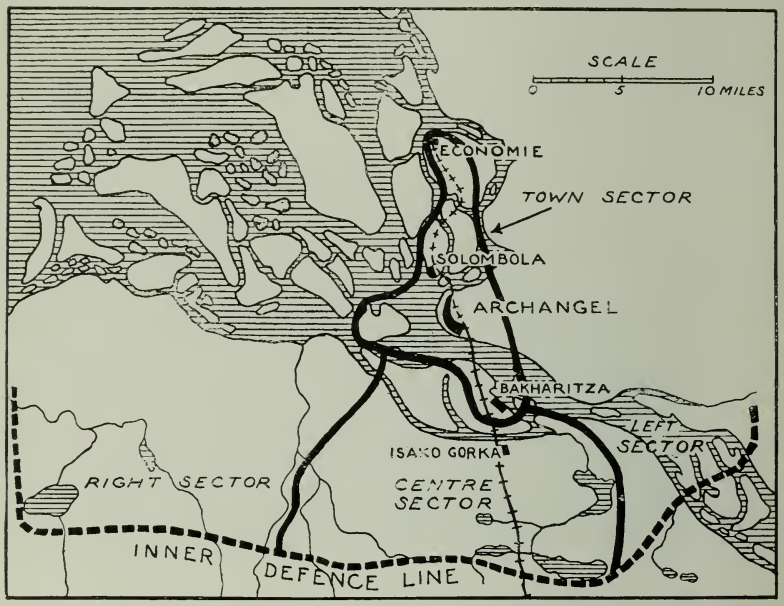


Tug and barge used on the Mkrenga River between Seletskoe and Shredmekrenga for evacuating wounded and conveying food.

capture of Puchega and Borok. The barges were towed by light-draught paddle steamers in the wake of the advancing troops, and when fighting took place were moored to the bank, the wounded being brought there by the R.A.M.C. personnel. The Naval Medical Service evacuated the wounded from the barges by paddle steamer to Bereznik, or, if there was no accommodation available there, direct to Archangel.

Towards the end of June 1919 the majority of the R.A.M.C. personnel were concentrated at the base and on the Dvina and Vaga fronts, that is, wherever British troops were stationed. Some 450 British troops remained to support the Russian forces on the railway and Seletskoe fronts, and as these were

widely scattered five officers and thirty-one other ranks R.A.M.C. were detailed to provide the necessary medical and sanitary supervision for the various detachments. When the enemy made a raid early in July on the lines of communication in the Pinega area, a detachment of British troops was sent to reinforce the Russian forces there. They were accompanied by a detachment of R.A.M.C. personnel with one small barge. Shortly afterwards, when offensive operations were contemplated beyond Pinega, further British reinforcements were



SKETCH MAP SHOWING THE DIFFERENT SECTORS OF THE INNER DEFENCE LINE ORGANIZED AT ARCHANGEL

sent up with R.A.M.C. personnel; but these operations were subsequently abandoned. Three medical officers and twenty other ranks R.A.M.C. also accompanied the reinforcements of British troops sent to Bolshiozerki and the railway front during August.

The embarkation at Archangel of 429 R.A.M.C. due for demobilization began during June. It was a matter of some difficulty to release men so widely scattered and to replace them by others, who had, in some instances, to be conveyed a distance of 173 miles, particularly at a time when offensive operations were in progress With the arrival of the two brigades of the relief force, the medical establishment of the

force received an addition of two field ambulances consisting of two sections each, with a total personnel of 16 officers and 338 other ranks. Although augmented by 80 other ranks withdrawn from the Russians, these barely sufficed to replace the personnel who were due for demobilization at the beginning of September. Of these, 254 embarked on 2nd September, and the remaining twenty-eight on the 14th.

Prior to the final evacuation a limited number of medical personnel was allotted to the various sectors of the inner defences of Archangel. These were distributed as follows :—

Sector.	*Officers.*	*O.R.*
Base	25	100
Right	7	40
Centre	7	50
Left	16	110
	55	300

On 1st July the Russians took over the arrangements for the evacuation of their own sick, and the detention hospitals in the following areas were handed over to them : Obozerskaya, Onega, Chesuga, Chekuevo, Seletskoe, Emetskoe, Pianda, Seminovskaya and Pless. At the same time, the Russians were urged to increase their hospital accommodation at the base, and on the departure of the Americans and French they took over the American Red Cross Hospital and Convalescent Depôt and the French annexe. The Russian medical authorities were also approached with the object of obtaining a decision as to which of the British hospitals at Archangel they wished to take over when the British troops finally withdrew from North Russia. The Russians then stated that they were willing to take over the three British Hospitals at Archangel. Owing to the depletion of R.A.M.C. personnel, No. 85 General Hospital had been closed on 28th August, but arrangements were made to hand over No. 53 Stationary Hospital and No. 82 Casualty Clearing Station intact on 19th September, with sufficient dressings and medicines to last for two months. During the first week of September a six months' supply of medical and surgical materials, and, during the second week, a large quantity of Red Cross stores, were handed over to the Russians.

The Russian medical and nursing services organized to take the place of the medical personnel of the " Syren " Force took over from the British service the medical units, including an ophthalmological centre, mobile dental surgery, mobile bacterio-

logical laboratory, mobile disinfecting van and X-ray department, which formed part of the medical organization in North Russia. The newly organised Russian service was functioning efficiently by 15th September, on which date there was a Russian field ambulance, ambulance train, casualty clearing station and base hospital at Kem, with medical store depôts at Murmansk and Kem, and a well-trained staff of Russian ladies for nursing duties.

An outstanding feature of the medical arrangements during the campaign was the extensive sanitary organization and the

Medical aid post, with a sanitary squad composed of Russian girls employed cutting wood.

large number of sanitary sections available. There were two sections attached to the "Syren" Force, and on the arrival of the relief force four sections were available for the Archangel force. One relieved No. 125 Sanitary Section, while of the remaining three one was sent to Bakharitza for the sanitary supervision of the railway front, one to supervise the Bereznik and Vaga River area, and the third to Troitsa to supervise the areas occupied by the attacking brigades. The two sanitary sections at Archangel and Bakharitza, with the aid of the local Royal Engineers, continued to supply sanitary appliances for use in the forward areas.

During the early spring of 1919, 130 Russians passed through a course of fourteen days' training in the School of Sanitation, and it was hoped that this would have some effect in lessening the insanitary conditions prevailing amongst the Russians.

An Embarkation Medical Officer was appointed on 9th May for duty at Archangel to supervise river transport and ocean-going steamers. As regards the former, apart from the cross-river work to Archangel from Archangel Preestin*, where all the sick and wounded from the railway front arrived by train, 85 officers and 1,512 other ranks arrived between 27th May and 20th September by river from the Dvina, Vaga, Emtsa, Pinega and Onega areas. They were disembarked on arrival at Archangel and transferred in motor ambulance cars or in tram-cars, or in the case of No. 85 General Hospital by hand carriage, to the various British or Russian hospitals at the base. All barges employed for the conveyance of troops were cleaned and sprayed with disinfectants before use, and a stock of medicines, dressings and medical comforts placed on board. Before embarkation in ocean-going steamers, all troops were disinfested, received a change of clean clothing, and were medically examined. All civilian refugees evacuated to the Baltic states and South Russia were medically examined for infectious and contagious diseases within twenty-four hours of embarkation.

In the area occupied by the "Syren" Force port sanitary officers were appointed at Murmansk and the White Sea ports to deal with the problems that arose in connexion with sanitation and the prevention of epidemics. The resources of the sanitary officers and personnel in this area were severely tried, owing to the fact that the troops were scattered over 500 miles of railway in small garrisons and outposts. To deal with troops at any part of the line, mobile steam disinfectors, baths, a dental coach and bacteriological laboratory were constructed on railway trucks and sent wherever they were required. The work of cleaning freshly occupied villages and disinfecting the houses before occupation was no light task. Small epidemics of one kind or another were constantly occurring amongst the civilian population in the villages and towns occupied by the British. An outbreak of scarlet fever amongst civilians at Alexandrovsk occurred in March 1919, and a small epidemic of typhoid fever at Kem Town in August. Sporadic cases of typhus and relapsing fever were diagnosed by British medical officers from time to time. In addition to the administration

* Archangel Preestin, a village on the south bank of the Dvina opposite Archangel, and the terminus of the Vologda Railway during the summer months. During the winter the railway line was laid across the ice and terminated at Economie.

of the allied medical services, the British Medical Service in this area supplied over fifteen Russian civilian hospitals with drugs and stores, and treated 22,097 Russians as "out-patients," while 671 were admitted to British hospitals and aid-posts and 168 operations performed.

A serious epidemic of smallpox broke out in April 1919 in the villages west of the railway in the Soroka area. This was arrested by a vigorous vaccination campaign conducted by British medical officers amongst the Allied and Russian troops and the civilians in the villages. Twenty-one cases were detected amongst the civilians and these were isolated. Reconnaissances were made throughout the villages, in the neighbourhood of the railway line, and all intending passengers were examined before being permitted to travel by rail. In this way the spread of the disease was arrested, and no case occurred amongst the British, French, Italian or Serbian troops. There were frequent sporadic cases of smallpox amongst the inhabitants of outlying areas occupied by the Archangel forces. Careful control of the movements of both troops and civilians was necessary, and large numbers of civilians were vaccinated by British medical officers.

At the outset there was no consulting physician attached to the force, and although the junior medical officers performed very useful work they lacked the guiding hand of a consulting physician. On 8th September 1918, Captain E. R. Hunt was appointed consulting physician to the North Russian force, with the acting rank of Lieut.-Colonel. He was succeeded by Lieut.-Colonel J. D. Comrie on 17th June 1919. Major D. C. L. Fitzwilliams was appointed consulting surgeon on 10th October 1918, with the acting rank of Lieutenant-Colonel while so employed, and Major R. Jamison was appointed consulting surgeon on 28th July 1919, with the acting rank of Lieutenant-Colonel. Major. E. G Anthonisz performed the duties of bacteriological specialist from 1st October 1918.

From the statistics available it will be seen that the sick incidence was not excessive. The following tables show the hospital admissions for sick of the "Syren Force" from September 1918 to September 1919, and those of the Archangel Force from June 1918 to May 1919. Of the diseases affecting the troops, ordinary coryza was almost unknown. Pneumonia was comparatively rare, except as a complication of other diseases. There was an outbreak of influenza in the autumn of 1918, which was thought to have been imported by a ship carrying American troops.

Sick Admissions: "Syren" Force, September 1918 *to September* 1919.

Disease.	1918								1919																				Total All Ranks.
	Sept.		Oct.		Nov.		Dec.		Jan.		Feb.		March.		April.		May.		June.		July.		Aug.		Sept.		Total.		
	Off.	O.R	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	
Cerebrospinal Fever ..	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
Diarrhœa	—	6	—	6	—	10	2	12	—	5	—	2	—	8	—	3	—	—	—	—	1	7	3	5	3	46	9	110	119
Diphtheria	—	—	—	2	—	—	—	2	—	—	—	—	—	—	—	—	—	2	—	1	—	—	—	—	—	—	—	7	7
Dysentery	—	—	—	2	—	1	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	1	—	—	—	—	—	6	6
Enteritis	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	—	5	5
Frostbite	—	—	—	—	—	—	—	3	—	23	1	20	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1	47	48
German Measles ..	—	—	—	—	—	—	—	2	—	—	—	1	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	6	6
Gonorrhœa	1	—	—	6	—	1	—	4	—	2	—	7	—	3	1	2	—	5	2	6	1	6	—	11	—	17	5	70	75
Influenza	3	48	4	47	—	36	—	122	—	31	8	41	—	48	—	24	—	13	—	3	—	1	—	2	—	11	15	427	442
Malaria	—	2	—	—	—	—	—	1	—	4	—	2	1	2	—	3	—	3†	—	7†	—	3†	—	—	1	6	2	33	35
Measles	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1	—	—	1	—	—	1	2	3
Mumps	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	2	2
Neurasthenia	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1
Paratyphoid	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1‡	—	—	—	—	—	1	1
Pneumonia	—	2	—	5	—	—	—	2	—	2	—	2	—	2	—	1	—	2	—	1	—	—	1	—	—	3	1	22	23
Relapsing Fever ..	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
Scabies	1	5	1	19	—	12	—	31	1	30	—	11	—	15	—	5	—	4	—	4	—	6	2	15	—	11	5	168	173
Scurvy	—	—	—	—	—	—	—	—	—	—	—	2	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	3	3
Syphilis	—	2	—	5	—	—	—	1	—	1	1	5	—	1	—	4	—	1	—	—	1	1	—	2	1	9	3	32	35
Tuberculosis	—	—	—	—	—	—	—	1	—	3	—	2	—	3	—	1	—	—	—	—	—	1	—	—	—	—	—	11	11
Venereal Sore ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1	1
Total	5	65	6	92	—	60	2	181	1	103	10	96	1	87	1	44	—	31	2	23	4	27	6	38	5	108	43	955	998
Other Causes, disease not specified	6	41	11	102*	5	99	19	210	20	253	29	360	14	240	15	197	19	180	23	274	43	298	40	177	43§	325§	287	2,756	3,043
Others than British admitted to hospital.	12	158	5	125	1	85	2	164	5	147	16	379	7	271	9	295	6	336	15	427	9	265	12	131	10	77	109	2,860	2,969
TOTAL	23	264	22	319	6	244	23	555	26	503	55	835	22	598	25	536	25	547	40	724	56	590	58	346	58	510	439	6,571	7,010

* Includes 30 injured in a railway accident.
‡ "N.Y.D."—discharged.
† 7 "N.Y.D." of whom 5 were discharged.
§ Includes 7 officers and 76 O.R. wounded in action.

Sick Admissions: British Troops, Archangel Force, June 1918 *to May* 1919.

Disease.	1918.														1919.												Total All Ranks.
	June.		July.		Aug.		Sept.		Oct.		Nov.		Dec.		Jan.		Feb.		March.		April.		May.		Total.		
	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	
Cerebrospinal Fever ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1	1
Diphtheria	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	2	2
Dysentery	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	2	1	—	—	—	—	4	2	6	8
Enteric Group ..	—	—	—	—	—	—	—	—	—	—	—	—	1	4	—	1	—	—	—	—	—	—	—	—	1	5	6
Typhoid	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	5	—	2	—	—	—	2	1	9	10
Paratyphoid ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	4	—	—	—	1	—	1	2	6	8
Gonorrhœa	—	3	—	1	—	2	1	1	1	8	—	15	1	28	—	37	—	16	—	34	—	19	—	—	3	164	167
Influenza	33	37	6	—	—	—	1	51	18	177	3	87	3	26	3	10	—	10	—	6	—	10	—	25	67	439	506
Measles	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	4	—	6	6
Mumps	—	—	—	—	—	2	—	—	—	—	—	—	—	2	1	7	—	1	—	—	—	—	—	1	1	13	14
Pneumonia	—	—	—	—	—	—	—	1	—	15	1	5	1	—	—	2	—	—	—	1	—	—	—	—	2	24	26
Scarlet Fever	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1	1
Syphilis	—	—	—	—	—	2	—	—	—	4	1	21	—	13	—	8	—	8	—	10	—	8	—	—	1	74	75
Tuberculosis (Lung) ..	—	—	—	—	—	—	—	—	—	1	—	—	2	1	—	—	—	—	—	2	—	—	—	—	2	4	6
Total	33	40	6	1	—	6	2	53	19	205	5	129	8	76	5	65	3	46	1	56	—	40	—	37	82	754	836
Non-British Troops Admitted to Hospital	—	4	—	2	—	17	10	200	9	274	4	115	1	127	—	53	3	73	57		39		26		—	—	1,014
Total	33	44	6	3	—	23	12	253	28	479	9	244	9	203	5	118	6	119	114		79		63		82	754	1,850

There were no cases of typhus fever, and up to 31st March 1919 57 cases of enteric group disease amongst the Allied troops had been fully investigated bacteriologically at the Central Laboratory, Archangel. Of these, 33 proved to be of the typhoid or paratyphoid group, 7 dysentery and 17 gave negative results. By the beginning of June the number of cases investigated had increased to nearly 100. There were three deaths, one from typhoid, one from paratyphoid B, and one from the enteric group of infections, the exact variety undiagnosed. The civilians in Archangel during February, March and April suffered from an epidemic of a disease diagnosed by the Russian doctors as " typhus," which, however, was almost certainly one of the enteric group of diseases.

Dysentery, together with an acute form of gastro-enteritis apparently of closely allied nature, was very prevalent amongst the civil population of North Russia, and was regarded by the Russians as a very serious malady with a high mortality. During the summer of 1919 a mild type of diarrhœa was common amongst the British troops, due apparently to organisms of the typhoid-dysentery group. Of these cases about one hundred developed into serious casualties in the base hospitals at Archangel, but there were no deaths, with the exception of two Russians who were both admitted to British hospitals in an advanced stage of the disease. The comparative immunity of the British troops in this respect was partly due to the sanitary precautions as regards the water supply and to the good quality of the rations, and partly also to the rapidity with which the evacuation to the base hospitals was effected. The method which was pursued of evacuating all febrile cases and cases with symptoms of intestinal infection as early as possible down the river was most salutary. The heat during the summer months, as already noted, was considerable, and the feverish patients often expressed their great sense of relief on being transferred to the barges used as floating hospitals or to the river transport boats, where breezes from the river tempered the heat and the mosquitoes were fewer.

Numerous cases of malaria were found recurring amongst soldiers who had contracted the disease originally in Salonika or India. The disease was endemic, though not very prevalent, in the province of Vologda. Various types of mosquitoes* were prevalent in North Russia, and Anopheles mosquitoes were found in large numbers at Bakharitza and on the Dvina

* A list of mosquitoes collected and identified in North Russia will be found in Diseases of the War, Vol. I, p. 262.

front. In view of the fact that healthy men were serving in the same units with men who had suffered from malaria and whose blood was found to contain the parasite, and taking into account the wide-spread presence of carrier mosquitoes, the very low incidence of fresh cases must be attributed to the extreme care of all the troops in the use of the mosquito curtains and head-guards.

Diseases of the lungs, kidneys and heart, rheumatism, and the commoner infectious diseases, such as scarlet fever and measles, were rare, but venereal diseases were responsible for 290 admissions to hospital amongst the British troops of the Archangel force from 27th May 1919. A factor that tended to increase the prevalence was that the French treated their gonorrhœa cases for a period of from seven to fourteen days only, when the patients were returned to duty and the treatment continued in their battalion medical inspection rooms. They were not confined to barracks, however, and were allowed to mix freely with healthy troops. In spite of the regulations introduced by the Russian Provisional Government and the free treatment of all infected women, there was no decrease in the incidence of the disease. This is no doubt attributable to the large numbers of refugees who flocked into the towns and villages held by the Allied troops, and to the large numbers of women affected before the regulations came into force.

Only four cases of scurvy occurred amongst the British troops in North Russia, but the Russian civil hospitals in the Murmansk area were crowded with scurvy cases in the early spring of 1919. To relieve them, a Russian civilian convalescent home was equipped with British medical and Red Cross supplies. Scurvy was very prevalent amongst enemy prisoners of war, and in the early days amongst Russian civil prisoners interned in the jails at Archangel and Modjuski. The rations were increased and fresh meat was given oftener, the germination of pulses was insisted upon, and all affected prisoners were sent to a hospital on Kegostrov Island. An officer of the R.A.M.C. was sent out by the War Office expressly to investigate scurvy, and when he began his researches on 18th June there were 225 patients in hospital. In nine weeks 215 of these had been completely cured, two had died and eight, though cured of the disease, still suffered from its effects as evidenced by ankylosed joints, the result of previous neglect. Some useful research work was carried out and apart from the knowledge gained it was thought that much good work was done by the care bestowed on the patients, many of whom were enemy prisoners.

The only remaining point to be noted concerns the exceptional bathing facilities afforded during the campaign in North Russia. Russian baths were available in every town and village, and arrangements were made for the troops to have the use of the baths on stated days. In some cases they were taken over entirely and staffed by sanitary personnel. These baths were greatly appreciated by the troops both at the front and in the base areas.

CHAPTER XXIII.

AMBULANCE TRANSPORT DURING THE WAR.

THE use and organization of the various means adopted for carrying sick and wounded by road, water or rail are referred to generally in the chapters dealing with the medical services in connexion with the military operations and in each theatre of war. A more detailed description, however, of the apparatus, vehicles and craft employed for ambulance transport is of historical interest and instructional value.

METHODS OF CARRYING WOUNDED BY HAND.

Field Stretchers.

While it was recognized that stretchers could be improvised for special occasions and for different methods of warfare, it was absolutely essential to have a standard pattern which would fit into wheeled stretcher carriers, ambulance wagons, motor ambulance cars and ambulance trains.

The Regulation Field Stretcher.—The Army pattern regulation stretcher, which had been in use before the war, stood the test of warfare, although occasionally it happened that, when an inferior quality of canvas had been used in its construction, the canvas was apt to tear along the sharp edge of the poles. To obviate this it was recommended that the sharp edge be rounded off. Changes or modifications were adopted from time to time to meet hygienic or surgical requirements. Thus, medical officers who had served abroad, were accustomed to fix up coverings or mosquito nets over the stretchers to protect the patients from the sun, dust and biting insects, and the Special Mark I stretcher was fitted with a hood for this purpose. It was found, however, that the hood was cumbersome and the material easily damaged. Nevertheless, the idea was good, and in tropical and malarial countries, such as Mesopotamia and Macedonia, the coverings, which at one time had been clumsy and improvised, were improved and lighter and more suitable constructions adopted. (Fig. 1.)

The modifications made to meet surgical requirements were of a more extensive character. Probably the first modification was the raising of the stretcher from the ground on trestles, or legs attached to the stretcher, and capable of being closed

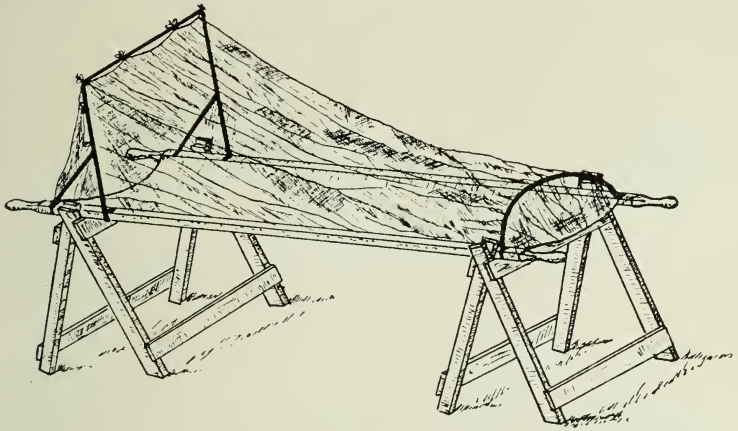


Fig. 1. Mosquito nets and trestles for stretchers.

or opened as required. This method came into use at casualty clearing stations, where stretchers on trestles were used as dressing tables or as improvised beds before hospital beds were supplied to these units. Afterwards they were used to provide beds for the less serious cases. The use of trestles or legs made

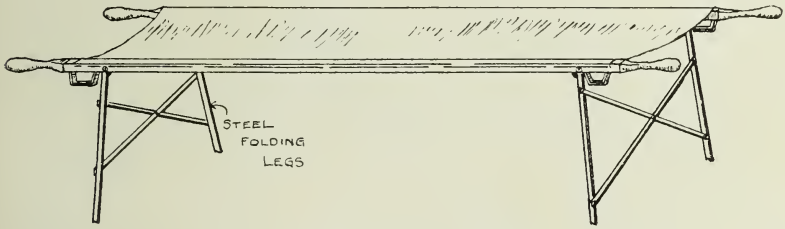


Fig. 2. Bed stretchers.

it easier for the surgeon, nurses and orderlies, in handling the patients, and also helped to maintain an appearance of neatness in the wards of a casualty clearing station.

The method was also used by field ambulances in certain areas, but the trestle stretcher could not be adopted universally owing to the difficulties of transport and its unsuitability for front line work. (Fig. 2.)

The next modification to meet surgical requirements was associated with the treatment of abdominal and chest wounds. Rests were devised which enabled medical personnel sometimes as far forward as advanced dressing stations to give abdominal cases the benefit of the Fowler position, and chest cases the advantage of being propped up. (Figs. 3 and 4.)

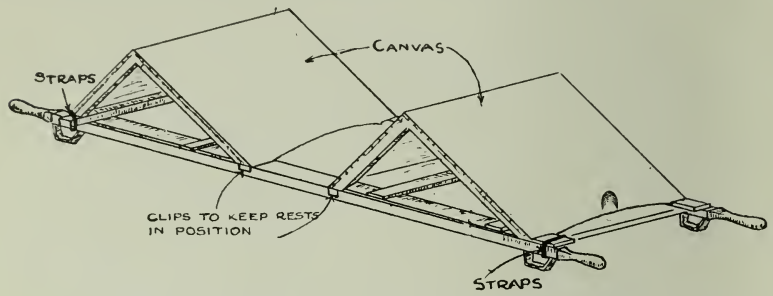


Fig. 3. "Fowler" position rests for abdominal cases.

The gradual elucidation of the problems connected with surgical shock introduced the methods for conserving the heat of a seriously wounded man*. An extra blanket and waterproof sheet were neatly packed and attached to stretchers in the front line, and extra blankets, hot water bottles and apparatus for heating bricks were supplied to regimental aid posts. Demonstrations were given, and circulars were issued

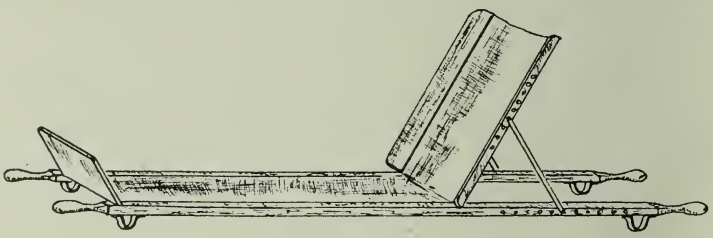
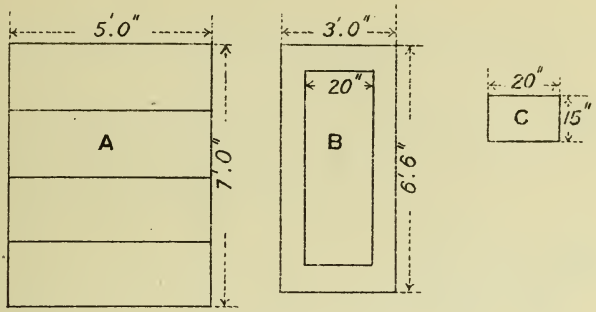


Fig. 4. Rest for chest cases.

showing the best manner for covering and keeping the wounded patient warm (Fig. 5). At front-line aid posts, at the hospitals on the lines of communication and at the base, réchauffement appliances were devised for stretchers (Fig. 6).

Finally the development in the treatment of fractures of the lower extremity brought about the design, manufacture and issue of suspension apparatus for stretchers (Fig. 7).

* In July 1914, Major Hull, R.A.M.C., strongly advocated the necessity of this in a paper read before the United Services Medical Society.



A. Service blanket folded four times.
B. Folded blanket on waterproof sheet
C. Blanket inside waterproof sheet folded four times and doubled.
D. Packed inside stretcher.

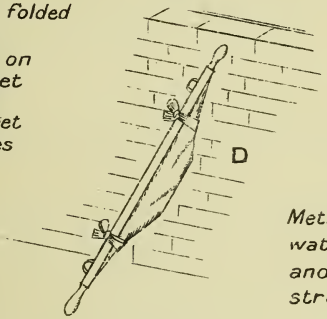


FIG. 5.

Method of carrying waterproof sheet and blanket with stretcher.

METHOD OF RECHAUFFEMENT

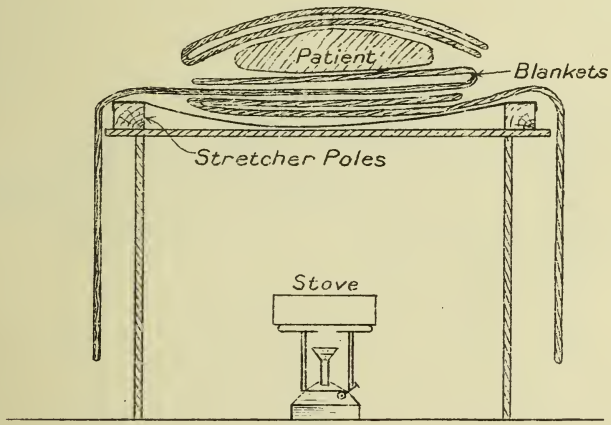


FIG. 6.

Malby & Sons, Lith.

Arm rests were also invented, but were not approved, as they interfered with the carriage of stretchers in ambulance wagons and cars.

Walton's "hospital stretcher" was designed to facilitate the dressing of a patient suffering from a serious gun-shot wound. The stretcher was tried, but the reports were unfavourable, and it was not adopted (Fig. 8).

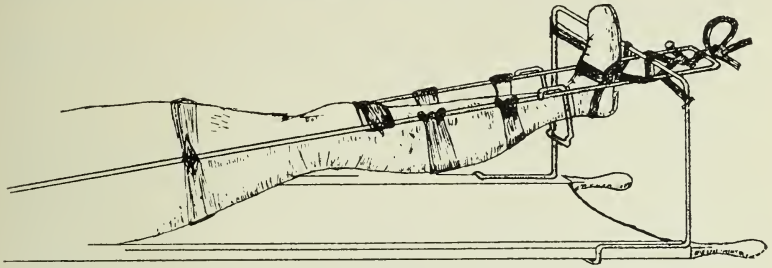


Fig. 7. Suspension apparatus for fracture cases of lower extremity.

Major H. R. Allen, of the American Army, Director of the Camp Greenleaf School of Applied Surgical Economics, worked out an ingenious way of using the poles of the American regulation hand litter as a splint to meet effectually in the field all the indications for the treatment of any fracture, but more

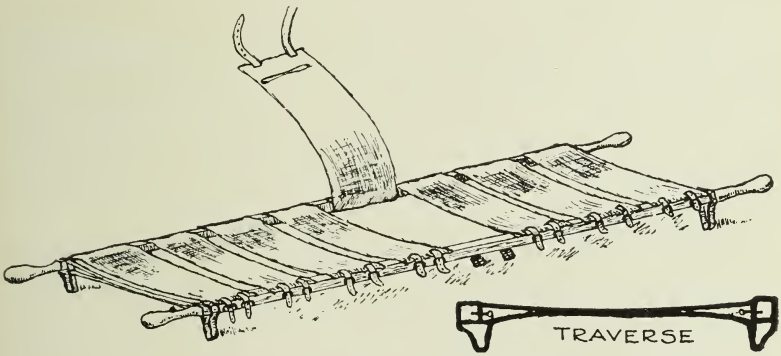


Fig. 8. Walton's "hospital" stretcher.

especially fractures of the extremities. He also adapted the litter for use as a field fracture bed, a field reclining chair, and a stretcher table.

The regulation stretchers were used occasionally for other than their legitimate purpose. They were shortened to fit into dug-outs, or used as beds for personnel, or for carrying loads. Many awkward situations arose at critical times on

account of these irregularities. Shortened stretchers would not fit into wheeled stretcher carriers, ambulance wagons or motor ambulance cars, and delay was caused when rapid evacuation was essential. At other times stretchers could not be found when wanted, or when found they were useless because the canvas was torn or the traverses smashed. The administrative medical services were constantly endeavouring to stop these irregularities.

Stretcher Slings.—In 1914 all regulation stretchers were issued with slings, and bearer personnel were instructed in the proper care and use of them.

During the war different varieties of slings were invented to facilitate the work of stretcher bearers. The War Office, on 20th December 1915, sent out specimen slings which allowed of a better distribution of weight. They were, however, more difficult to adjust, could not be worn with the new equipment, and did not facilitate the raising or lowering of loaded stretchers.

The Scott-Cantlie stretcher webbings were brought to the notice of the authorities in France on the 2nd July 1916. These slings gave a better distribution of the weight, could be worn under the kit, and accordingly were not easily lost. In using them the bearers suffered less fatigue, but as they fixed the bearers' hands to the stretcher poles, they were dangerous in a slippery trench.

On 19th May 1917 Sergeant R. G. Green, R.A.M.C., designed belt slings, but the modification was not considered to be of sufficient value to make its universal adoption advisable.

All these methods were tried in the different armies, but none became an authorised issue. The general idea was that slings were of little use, and frequently they were not issued with new stretchers.

Stretcher Drill.—Although it was definitely laid down in the R.A.M.C. Training Manual of 1911 that stretcher bearers should not carry loaded stretchers on their shoulders, in time it became recognised that this was one of the least fatiguing methods of carrying stretchers, and a memorandum describing the details of the procedure was circulated to all units. In this connection it is interesting to recall the experiences of the Army Bearer Corps, which came to France with the Indian Corps. The personnel of this corps, which accompanied the Lahore and Meerut Divisions Field Ambulances to France, was hastily enlisted in August 1914. Regular R.A.M.C. and I.M.S. officers assiduously trained them in the regulation drill at every available opportunity, in order to prepare them

for work in the front line. In October 1914, on the first day the personnel had to clear wounded from the front line, all ideas of regulation stretcher drill were abandoned, and the bearers did not hesitate for a moment in raising the loaded stretchers on to their shoulders, a method inherited from many past generations of their caste.

Supply of Stretchers.—Regimental and medical units were supplied with a definite number of regulation stretchers on mobilization, but a comprehensive scheme for supplying units with additional stretchers, or for replacing those lost or damaged in battle, had not been recorded in an official manual, nor had it been considered in any staff scheme prepared before the outbreak of war in 1914.

In the earlier stages of all the campaigns, evacuation was delayed owing to the deficiency of stretchers, and the demand for more stretchers was raised by all units. Advanced dressing stations could not return to regimental units the stretchers on which patients had been received, as medical officers would not willingly remove a seriously wounded patient from a stretcher when they knew they could not transfer him to another and that the man had to be evacuated.

At the beginning of the war, as a result of the shortage of stretchers, to which reference has been made in the first and second volumes of the General History of the Medical Services, officers commanding medical units obtained additional stretchers as best they could, and the officer with experience and initiative fared best. But this state of affairs did not promote general efficiency.

The first comprehensive scheme for the supply of stretchers to units in the front line formed part of the medical arrangements by the D.M.S. of the First Army, Surg.-General W. G. Macpherson, for the battle of Loos in September 1915, when dumps were formed at casualty clearing stations for replacing stretchers in field ambulances according to a definite system. A further reserve of 2,350 stretchers under G.H.Q. was established at No. 4 Stationary Hospital, St. Omer. With the establishment of this organisation for maintaining a supply of stretchers in front line units, the field ambulances, which had accumulated numbers of stretchers in excess of immediate requirements, were called upon to return the surplus to the regulated dumps. Medical officers of front-line units, finding their stock thus reduced, were apt to complain of a shortage of stretchers, as it was the first time in their experience in which they found themselves obliged to rely on the medical organization behind

to replenish their stretcher supply during battle. The new organization provided for a constant supply of stretchers to replace wastage, and without such a systematic arrangement there would have been a dearth of stretchers at the vital points, with an accumulation of stretchers at non-vital points.

Similar difficulties arose in all the campaigns, and schemes were devised to meet them. In each scheme the number of stretchers authorized for each unit and for the formation of stretcher dumps was carefully considered, as any question of additional equipment was closely associated with the supply of transport. In the stationary or trench warfare in France, the problem was more easily settled than in mobile warfare, such as the advance on Baghdad in 1917, the advance on Aleppo in 1918 and the advance in France in 1918.

The supply of stretchers to regimental units was more difficult. In October 1917 the matter was discussed at a conference of commanding officers in the First Army in France. They considered that in action the supply of stretchers to a battalion was inadequate, and that this shortage was in part due to the casualties to the stretchers themselves. They suggested that an additional supply should be issued as area stores, from which all units could draw stretchers during an action and to which they should return them after the action was over. The details of the scheme ultimately adopted by the First Army are instructive.

Scheme for the Supply of Stretchers in the First Army, 7th January, 1918.

Number of stretchers authorized :—

(1) 216 per division.
848 per casualty clearing station when fully open for the reception of sick and wounded.
200 per motor ambulance convoy.

(2) 400 per division extra to establishment. This number in conjunction with those at a casualty clearing station (not in action) was sufficient for
(*a*) Formation of forward dumps ;
(*b*) Circulating dumps at casualty clearing stations in action.

(3) The D.D.M.S. of each corps was responsible for all stretchers in his corps, and could distribute them by
(*a*) Sub-letting them to divisions in forward areas ;
(*b*) Using them in rest stations ;
(*c*) Forming a reserve under his own hand.

(4) No stretcher extra to establishment was removed by divisions leaving the Army. Stretchers were salved whenever possible, and a census was taken in each formation at regular periods, more especially after an action, with a view to equalizing the number of stretchers with each unit and at each dump.

(5) Forward dumps were formed by A.Ds.M.S. near the regimental aid post whenever active operations were impending.

(6) Circulating reserve dumps were formed by D.Ds.M.S. at casualty clearing stations.

Before all extensive operations, the Director of Medical Services of the Army engaged obtained whatever number he considered his army should have. In addition, each ambulance train was obliged to carry one hundred spare stretchers to hand over as required to replenish dumps at casualty clearing stations. The ambulance trains were restocked from the ambulance train depôt at the base. From March to December 1917 as many as 17,000 stretchers were issued to front areas in this way, not including the stretchers given in exchange for those on which lying-down cases were entrained.

The number of stretchers held in stock and reserve in the Ordnance Depôts at the base was over 53,000. An ample supply was thus available, and the difficulty previously experienced by front line units in replacing stretchers sent down in the ambulance trains was overcome.

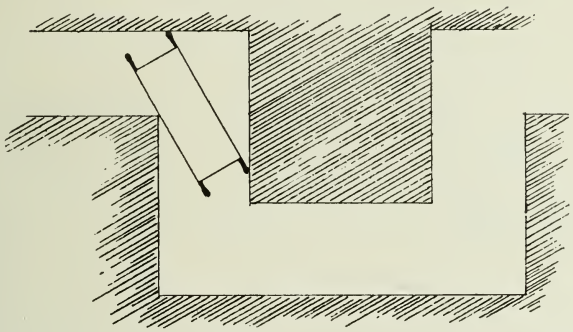


Fig. 9. Diagram of trench traverse showing difficulty of negotiating angles with regulation field stretcher.

Trench Stretchers.

The regulation field stretcher was not well adapted for use in fire trenches and front line communication trenches in France. The difficulty of carrying it round corners is shown in Fig. 9. Until 1915 improvised methods, such as hauling a man on a blanket or waterproof sheet, were in use, although several types of trench stretcher had been used in previous wars and had been described and illustrated in Longmore's " Ambulance Transport," published in 1869.

In March 1915 Major J. A. Y. Rogers, R.A.M.C., T.F., used a trench stretcher which overcame the difficulty of negotiating corners in a trench traverse. (Fig. 10). The stretcher was light, easily applied and simple in construction, and was used with great success at the battle of Neuve-Chapelle. Medical officers quickly realised its merits and recommended its use,

but it was not until Colonel Pike became D.D.M.S. of the Indian Corps in July 1915 that a recommendation was sent by him through the D.M.S. of the First Army to the Director-General that Rogers' stretcher should be issued for universal use. While this proposal was under consideration, Brig.-General Seely, on 28th July 1915 recommended the use of hammocks ; A.Ds.M.S. of several divisions also pointed out the difficulty that the bearer personnel had in evacuating certain cases from the front line. Lieut.-Colonel P. Evans, when he was in charge of the administration of motor ambulance convoys at G.H.Q. in France, suggested that the seat of the Rogers' stretcher should be double, and the body bands increased by five inches ; also that slings should be issued, and light iron traverses fixed to the poles.

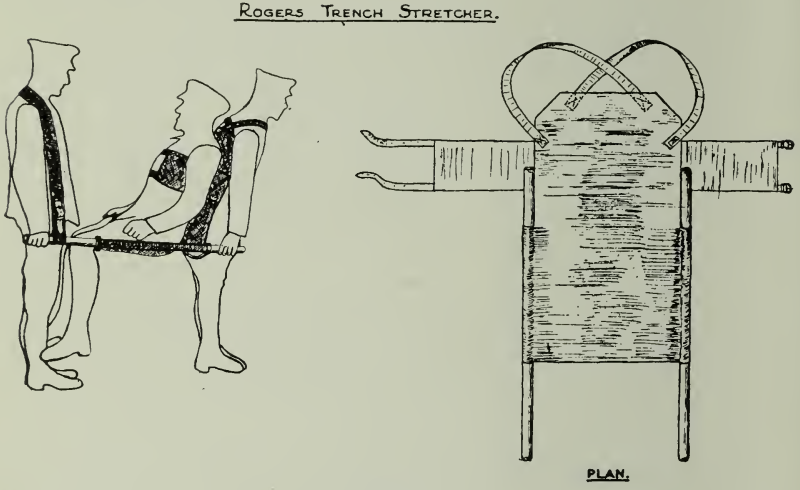


Fig. 10.

On 27th October 1915 an authorized number of Rogers' trench stretchers was sanctioned, 36 for each field ambulance, 24 for each cavalry field ambulance, 4 for each infantry company, and 2 for each squadron of cavalry. These stretchers were also issued to yeomanry and infantry proceeding overseas from the United Kingdom.

Although Rogers' trench stretcher was not ideal for every locality where trench warfare was in progress, it served a useful purpose, and stimulated medical officers to design other forms of stretchers for use in trenches. Suggestions and specimens were submitted to administrative medical officers

with great regularity ; so much so that Surg.-General Pike, when D.M.S. of the First Army, reconsidered his previous recommendation, and suggested that the issue of Rogers' trench stretcher should be discontinued.

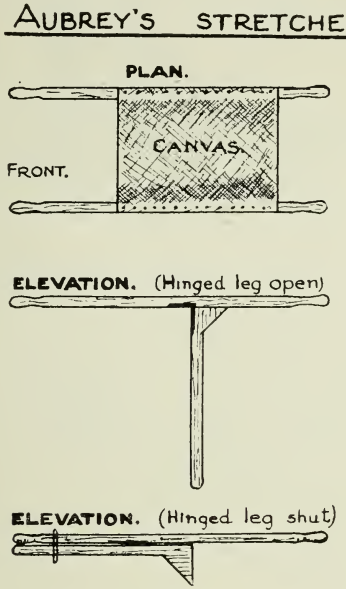


Fig. 11.

It was evident, however, that no one device was capable of meeting every contingency, nor could supply depôts at home manufacture the numerous trench stretchers suggested.

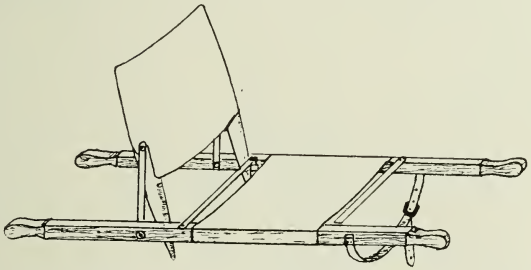


Fig. 12. The Goodacre stretcher.

It was decided, therefore, to retain the Rogers' stretcher as the official pattern, but to allow formations to use such other models as could be made locally. Divisions were thus encouraged to use their own modifications.

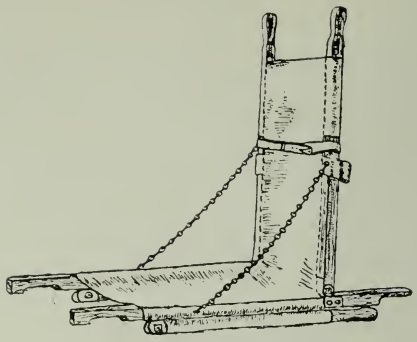


Fig. 13. The Willis stretcher.

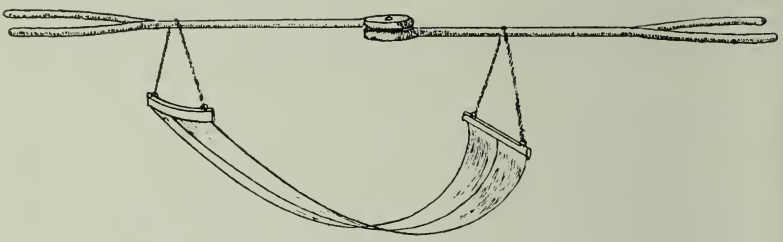


Fig. 14. The Colt stretcher.

THE JOHNSTONE-STIRLING
WEBBING TRENCH STRETCHER.

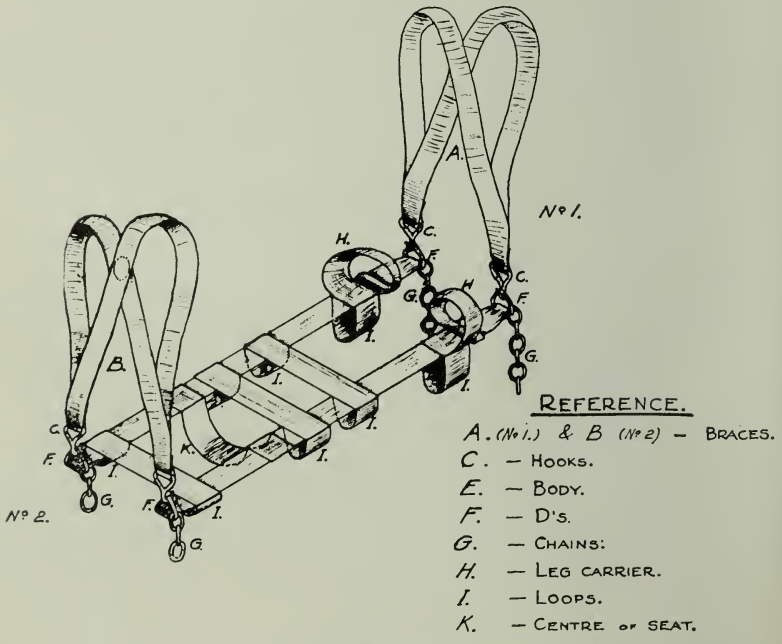


Fig. 15.

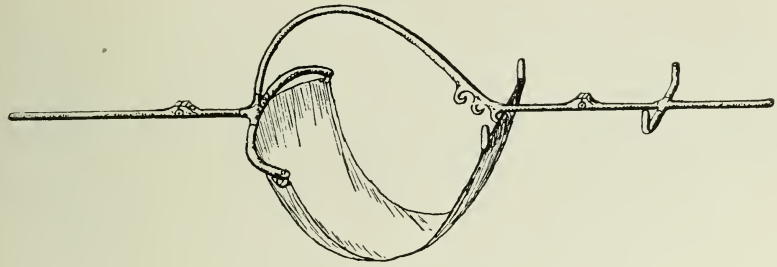


Fig. 16. The Graves stretcher.

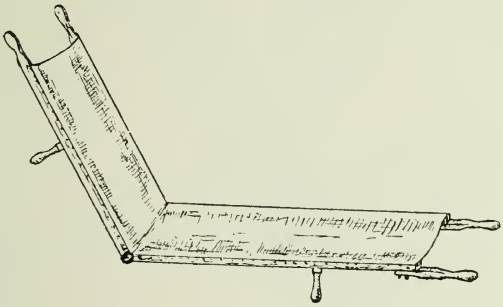


Fig. 17. The Langley-Jones stretcher.

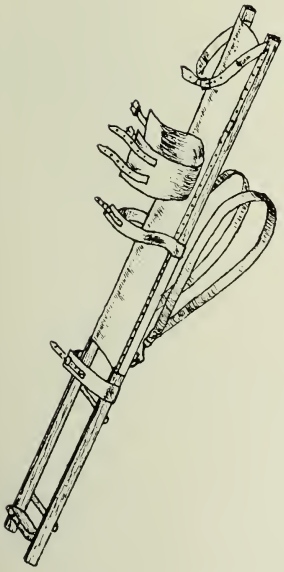


Fig. 18.
The Welsh stretcher.

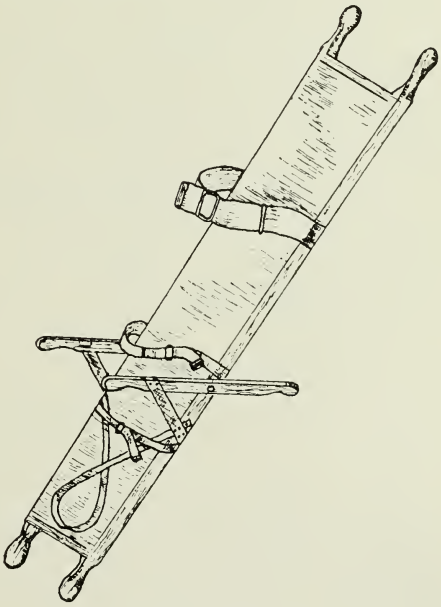


Fig. 19.
The Butler stretcher.

The essentials in any trench stretcher are simplicity, lightness, easy portability when loaded and used in narrow trenches, and absence of any mechanism liable to go out of order in the trying conditions of trench warfare. It was decided that no advantage would have been gained by selecting for universal use any of the patterns illustrated in Figs. 11–24.

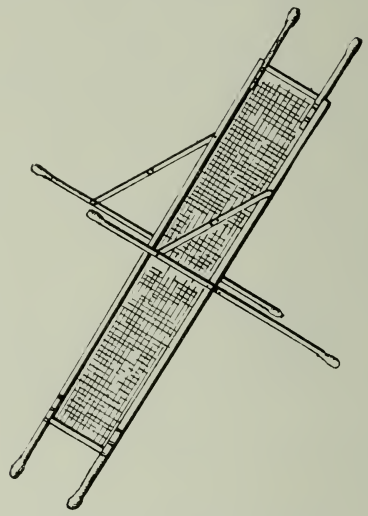


Fig. 20. The Meek stretcher.

The designs can be grouped into the following classes : the chair pattern, the perpendicular pattern, the collapsible or sack pattern field stretcher.

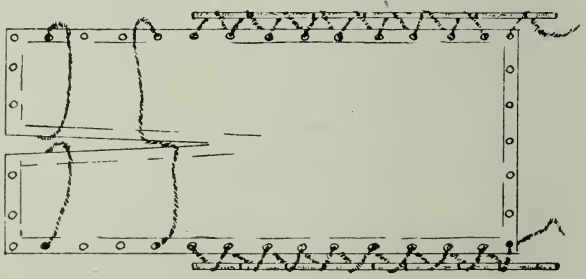


Fig. 21. The Grant stretcher.

Diagrammatic sketches illustrating the principles of these groups are reproduced. The chair pattern types are represented by the Aubrey (Fig. 11), Goodacre (Fig. 12), Willis (Fig. 13), Colt (Fig. 14), Johnstone-Stirling (Fig. 15), Graves (Fig. 16) and Langley-Jones (Fig. 17), inventions.

The perpendicular pattern is illustrated by the diagrams representing the Welsh (Fig. 18), Butler (Fig. 19) and Meek (Fig. 20) trench stretchers. The main point in these stretchers was that the patient could be tilted up in carrying him round a corner of a traverse, but the disadvantages were the numerous straps which required adjusting when the stretcher was tilted in an upright position, and in some localities the trenches did not provide cover for the patient's head and shoulders.

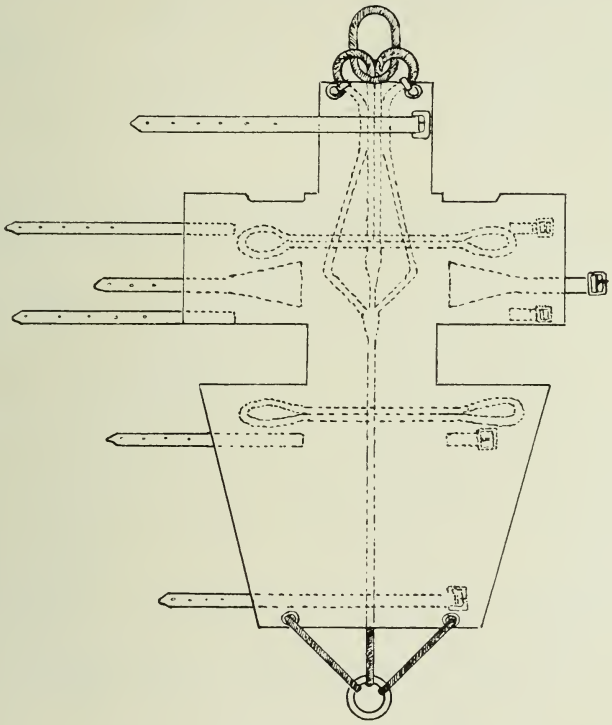


Fig. 22. The Neil Robertson stretcher.

The collapsible or sack pattern was first represented in the majority of improvised methods used in 1914. Colonel Soltau and Captain Maclean designed special handles for use with ground sheets. They were tried, but were not approved. Further developments with a ground sheet were originated by Grant, who designed a stretcher resembling the Indian pattern blanket stretcher which, however, had proved a failure in Gallipoli. (Fig. 21.) The Neil Robertson stretcher was officially used in the Royal Navy and proved very useful in Gallipoli. (Fig. 22.)

The modified field stretcher patterns represented by the Sussex Yoke and Withers' models were too complicated for universal use. (Figs. 23 and 24.)

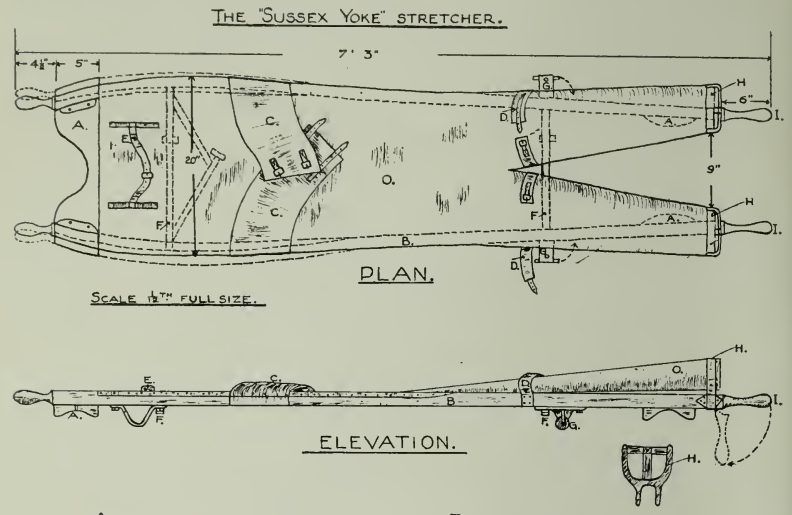


Fig. 23.

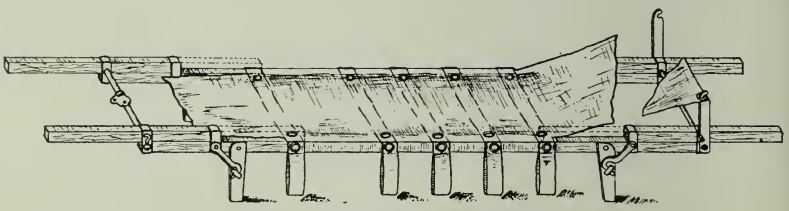


Fig. 24. The Withers stretcher.

Cavalry Stretchers.

Medical officers serving with cavalry units considered that the regulation field stretchers and Rogers' trench stretchers were unsuitable for collecting cavalry casualties in open warfare, because the former were not easily carried, and the latter did not give sufficient support to men with severe fractures and other serious injuries. Special stretchers for cavalry were consequently designed The types which were most

favoured were of a light pattern made from trench stretcher poles and a hinged regulation stretcher. (Fig. 25.) A conference of assistant directors of medical services of cavalry divisions was held on March 12th 1917, at which it was agreed that the jointed light stretcher (Fig. 26) with double bayonet catch, should be the form adopted for pack mounted sections and stretcher bearers of the cavalry corps.

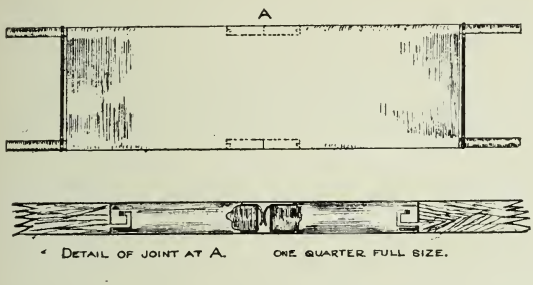


Fig. 25. Cavalry stretcher. The poles are similar to those of trench stretchers, made of ash (3 feet 6 inches by 1½ inches). Two poles are joined together by a tube of steel over the whole thickness of the poles secured in position at either end by a bayonet catch. The poles are prevented from disengaging by a spring at the inner end of either pole.

The canvas is 5 feet 9 inches in length, 1 foot 7 inches broad, and has a 4-inch fold sewn down either side through which the poles are passed.

The bar and double-ring spreaders, of ⅜-inch iron, are such as are used with the trench stretcher.

The weight of the whole stretcher is about 15 lb.

When not in use the steel tube is passed over the outer end of a pole and is kept in position by the bayonet catch.

The tube should be of steel, not iron, to save weight and increase its strength.

The ordinary regulation stretcher slings can be used with this stretcher.

The number of these stretchers recommended for the Cavalry Corps was as follows :—

	Number of stretchers per unit.	Total number of stretchers per cavalry corps.
Pack Mounted Sections	8	120
Cavalry Regiments	6	270
R.H.A. Batteries	2	30
Reserve	—	80
Total		500

The suggested mode of carriage was by pack mounted sections on a pack animal, and by regimental stretcher bearers in rifle buckets or in extemporized bags slung from the saddle.

As the question of construction and the weight to be carried by the horse were matters for the Cavalry Corps staff to decide, the stretchers were inspected and the proposals were considered by the Cavalry Corps Commander. He agreed that the jointed pole stretchers were excellent for the pack section of a cavalry field ambulance, but he did not consider that the stretchers should be carried by cavalry regiments on account of the extra weight put on the horses. The jointed pole stretcher was not recognised as a regulation stretcher, the usual procedure of obtaining unofficial stretchers was adhered to, and individual units were allowed to obtain their requirements locally.

With regard to the hinged regulation stretcher, only four could be carried on a pack-horse, but no satisfactory means of so carrying them had been devised when the Cavalry Corps was demobilized. The way likely to prove most suitable was to carry them vertically in a sling, two on either side of the pack-horse.

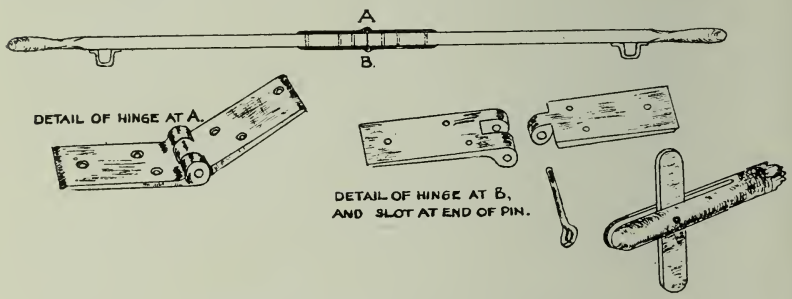


Fig. 26. Detail of cavalry stretcher.

Blanket Stretchers.

The regiments in the Indian Expeditionary Forces were equipped with blanket stretchers when they left India, but these stretchers proved unsuitable for either trench or ordinary use and were withdrawn.

Dandies and Dhoolies.

Dandies and dhoolies formed part of the equipment of Indian medical units. They were used for carrying patients in tropical countries but were heavy and cumbersome. The medical units which accompanied the Indian Expeditionary Force to France were not equipped with them.

A light folding dhoolie was devised by Major D. S. Skelton and used by the Zanzibar Field Ambulance in the German East African Campaign. Fig. 27 shows it closed, together with

the method of carriage; and Fig. 28 shows the manner in which the Swahili stretcher bearer carried it when loaded. It may be mentioned that in the latter illustration, a strap should be shown which could be fastened round the chest of the wounded man to prevent him falling out. Carrying the dhoolie on the shoulder, as is shown in the photograph, the stretcher bearers can march all day. The stretchers were made in Zanzibar by local carpenters and the iron work was executed in the Bazaar.*

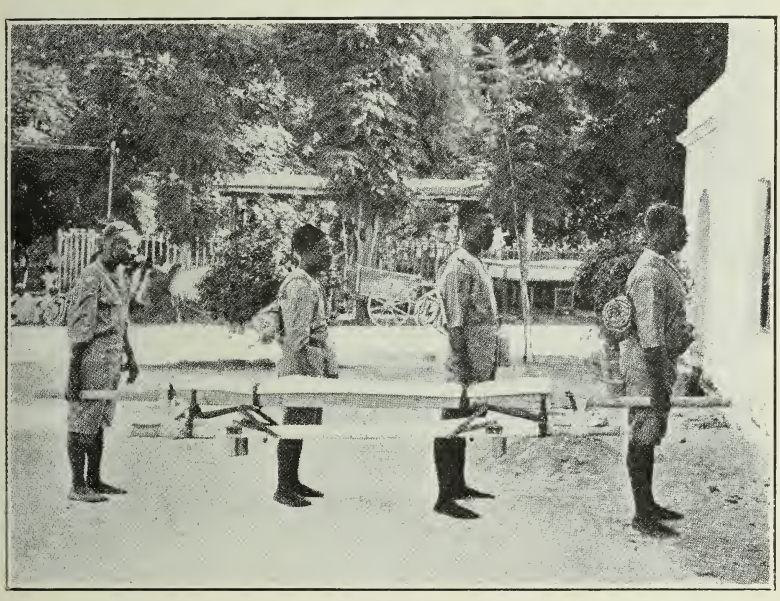


Fig. 27. Light folding dhoolie devised by Major D. S. Skelton, showing it closed, together with method of carriage.

Hammocks.

Hammocks and stretchers made from forest poles with a a bed of intertwined bark strips (tie-tie) were used during the operations in the Cameroons.

The hammocks had tops for protection against sun and rain, and the body of the hammock was either of the flexible, or, for bad cases, of the rigid naval cot type.

* A stretcher-dandy of a folding pattern had been designed by Major-General Sir W. G. Macpherson, when a young surgeon in India in 1888. (*See* Longmore's "Manual of Ambulance Transport," 2nd Edition, pp. 134-9.)

A locally designed rigid cot stretcher which could be used either as a stretcher or as a covered cot gave good results. Bush-made stretchers were employed as far as possible to transport the native sick and wounded down the lines of communication, and thereby save the labour which would have been necessary to bring the regulation stretchers back to the front if these had been employed for this purpose.

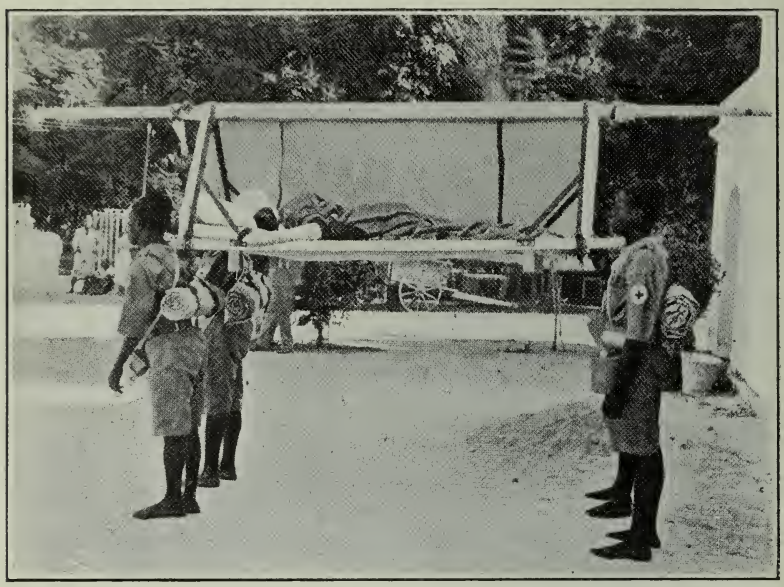


Fig. 28. Showing method of carrying light folding dhoolie when loaded.

Hospital Stretchers.

Several devices were used occasionally in base hospitals for moving patients.

A carrying device was invented by Dr. Collingwood Fenwick, which consisted of a piece of canvas with four handles on either side. By means of this a patient could be moved from bed to the operating table and back again without any handling of his person.

The "Townsend-Lock" bed lift and supporter was invented by two members of the Inquiry Bureau of the 2nd Southern General and Beaufort War Hospitals, Bristol, and their auxiliaries. It consisted of two square frames running on swivelled rubber-tyred wheels, and when adjusted to the bed afforded

a ready means of wheeling a patient in bed into the open air, without any jarring or discomfort, even over grass or uneven ground.

Another device for carrying a patient in bed into the open air was invented by Surgeon A. Geoffrey Evans, R.N., in the form of a bed carrier. It consisted of two stretcher poles joined at each end by a jointed flat iron bar, which, when

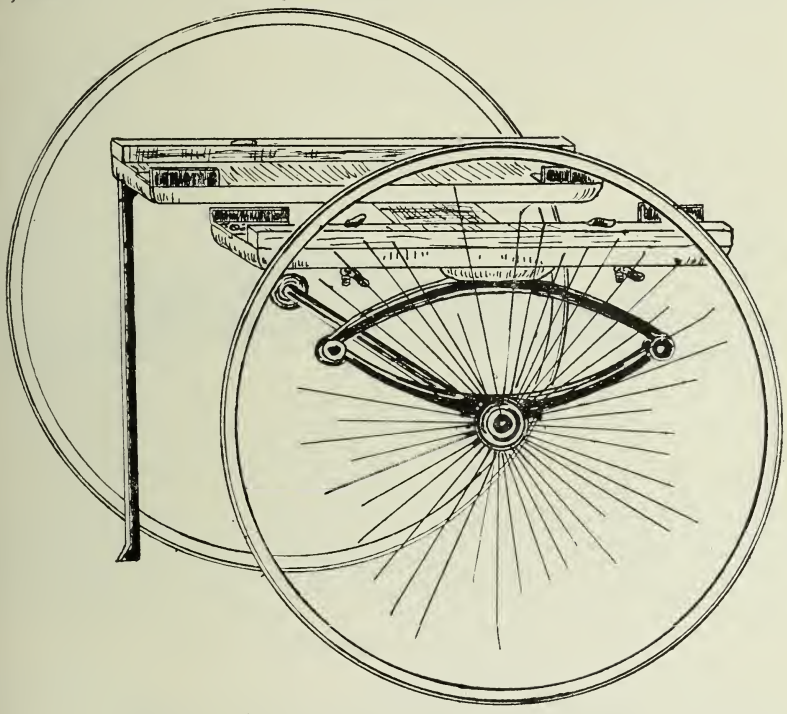


Fig. 29. The McCormack-Brook stretcher carrier.

extended, prevented collapse of the poles. When in use the carrier lay under the bed frame and was kept in position by buttresses against the legs of the bed. It was a simple contrivance and enabled two men to do the work of four.

Wheeled Stretcher Carriers.

The regulation wheeled stretcher carrier was not adapted for field service, but could be utilized with advantage where there were good level roads, and for the transport of cases in a general hospital. Field ambulances were consequently not supplied with stretcher carriers on mobilization.

The want of them, however, for use in the field was felt early in the war. The bearers were called upon to undergo exceptional physical fatigue, which was increased by the different height of bearers, irregularity of step, length of carry and frequent lowering and raising of stretchers. Also the time spent in evacuating cases by hand carriage could be lessened by the use of wheeled carriers. Many requests for wheeled stretchers were consequently made by medical officers during 1914, but no steps were taken to supply field ambulances with them in that year. The first definite step to provide them was taken during the battle of Aubers Ridge in May 1915, when the A.D.M.S. of one of the divisions informed the D.M.S. of the First Army that the bearers of his units were employed for

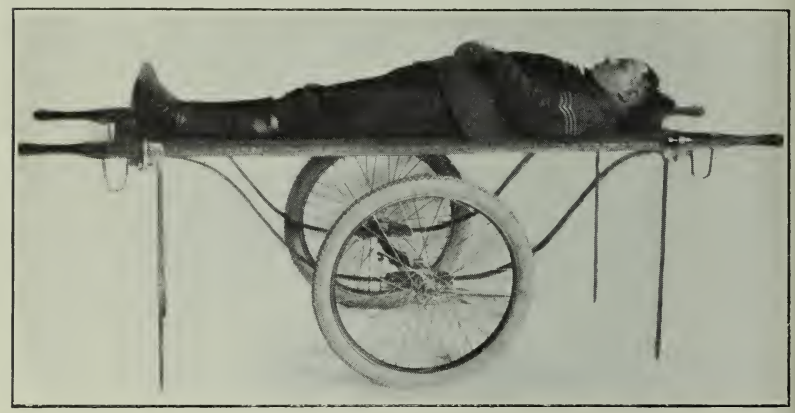
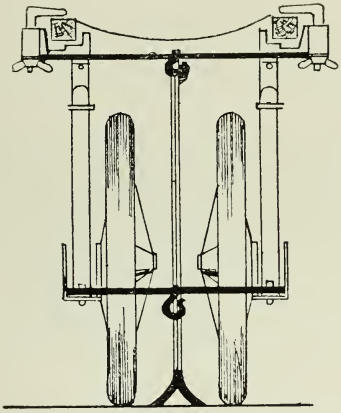


Fig. 30. The Miller-James stretcher carrier.

twenty-six consecutive hours clearing wounded. He calculated that the casualties would have been cleared in half the time if wheeled stretchers had been available. The D.M.S., Surg.-General W. G. Macpherson, thereupon urged the Director-General to sanction the issue of three wheeled stretcher carriers to each field ambulance. He pointed out that various forms of carriers were in use in the United Kingdom, and that it was unnecessary to adhere to the McCormack-Brook regulation stretcher carrier as it was high and unwieldy, easily overturned and of little use on rough roads and tracks. (Fig. 29.) Different varieties were recommended, obtained and tested, and in June 1915 the Commander-in-Chief informed the War Office that the force would require 500 collapsible wheeled stretchers of the Miller-James pattern. (Figs. 30 and 31.)



THICK BLACK LINES INDICATE NEW PARTS.

Fig. 31. The Miller-James stretcher carrier closed.

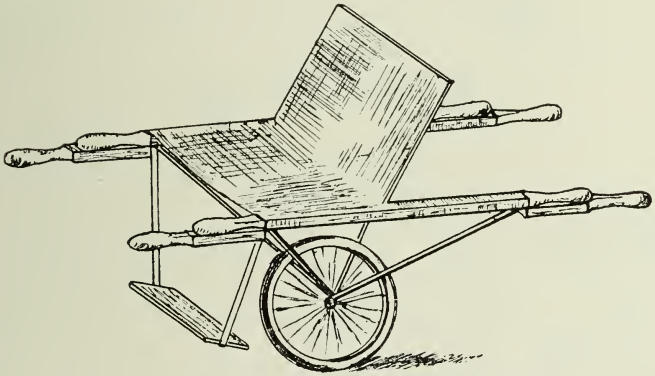


Fig. 32. The Blackham stretcher carrier.

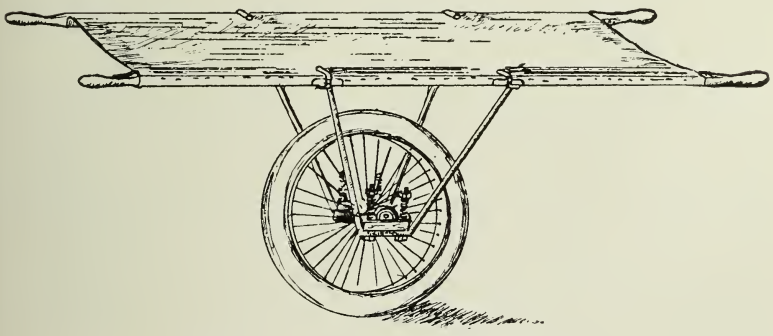


Fig. 33. The Walker stretcher carrier.

A scheme for their distribution was submitted to the directors of medical services of the armies, and after considering their reports it was decided to allot twenty wheeled stretcher carriers to each division.

Wheeled stretcher carriers were used both in front line trenches and roads, and behind the advanced dressing stations on all fronts. After the Miller-James and other forms of wheeled stretchers were issued, improvements were designed or made, French and Belgian types were obtained, and all were tried and tested. In this way four types of wheeled stretcher carrier which were constructed to carry either one or two stretchers, or one stretcher and kit, became familiarly known.

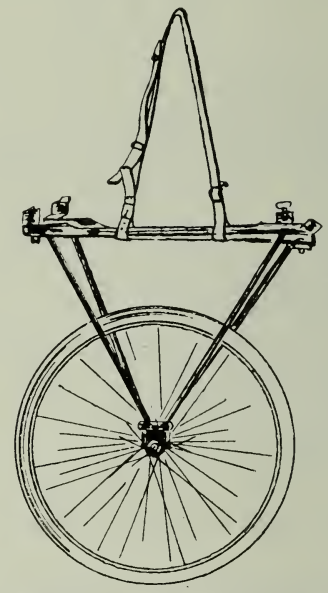


Fig. 34. The Luce mono-wheel stretcher carrier.

Diagrammatic sketches of the different wheeled stretcher carriers, prepared from photographs, drawings or plans, are shown in Figs. 32 to 47, as the ideas are presented better in this form than by a detailed description of each. Most of them were found after trial impracticable for use in the field for various reasons. As all modifications could not be adopted, reliability and expense were two important factors upon which the army medical authorities formed their judgment. The two types found most suitable are shown in Figs. 30, 31 and 42.

THE "CLOSE" FOLDING AMBULANCE STRETCHER CARRIER.

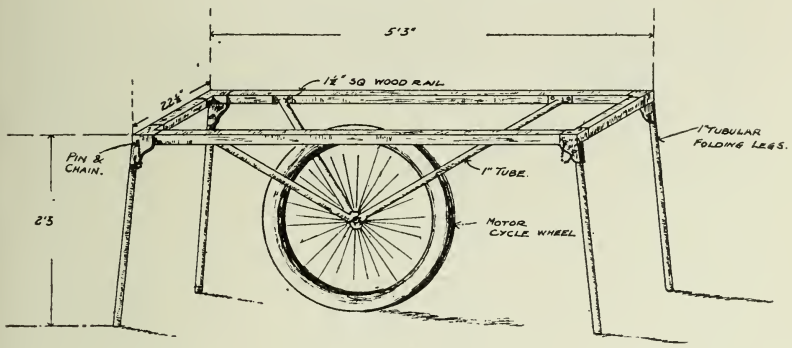
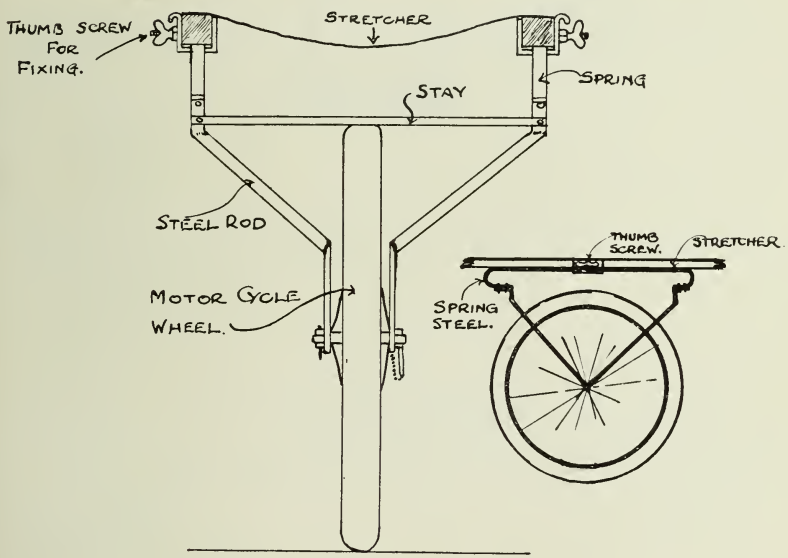


Fig. 35.



CROSS SECTION AND DIAGRAM OF SIDE VIEW.

DESIGN OF WHEEL ATTACHMENT FOR AMBULANCE STRETCHER BY LIEUT. COLONEL H. STREATFEILD.

Fig. 36

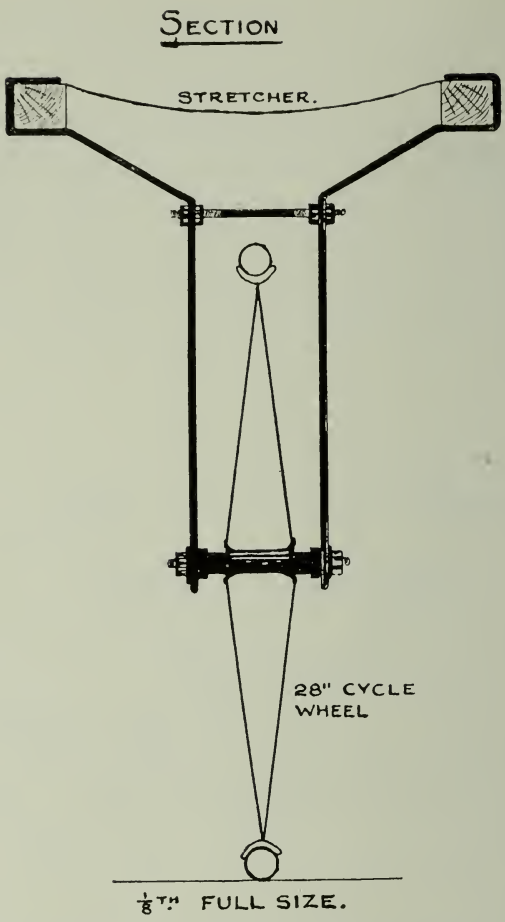


Fig. 37. The Grieveson stretcher carrier.

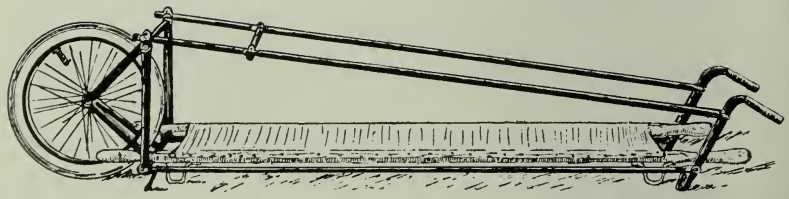


Fig. 38. The Hudlass and Smith stretcher carrier.

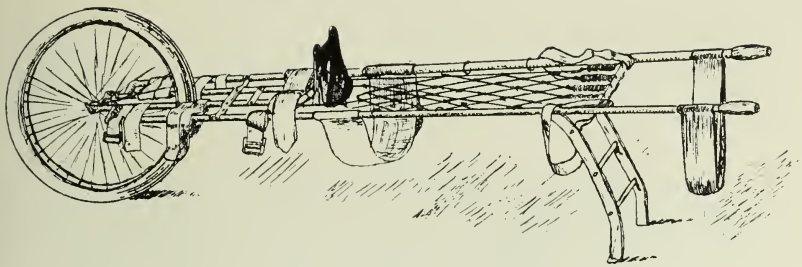


Fig. 39. The Victor stretcher carrier.

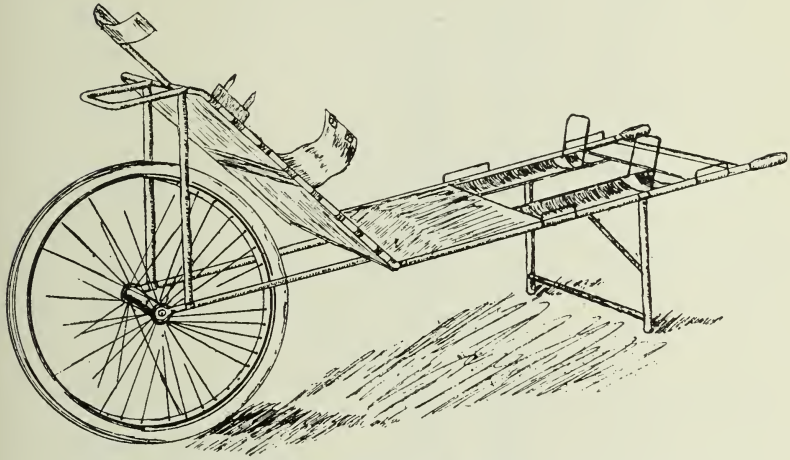


Fig. 40. The Day modification of the Victor stretcher carrier.

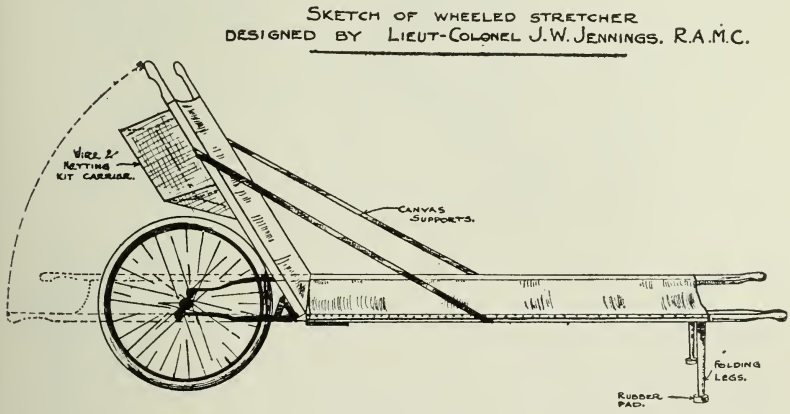


Fig. 41.

For use in the trenches the mono-wheel variety was suitable, but it could only be used when the trenches were broad enough, and when the duck-boards were placed transversely. It was used with success at Ypres in 1917.

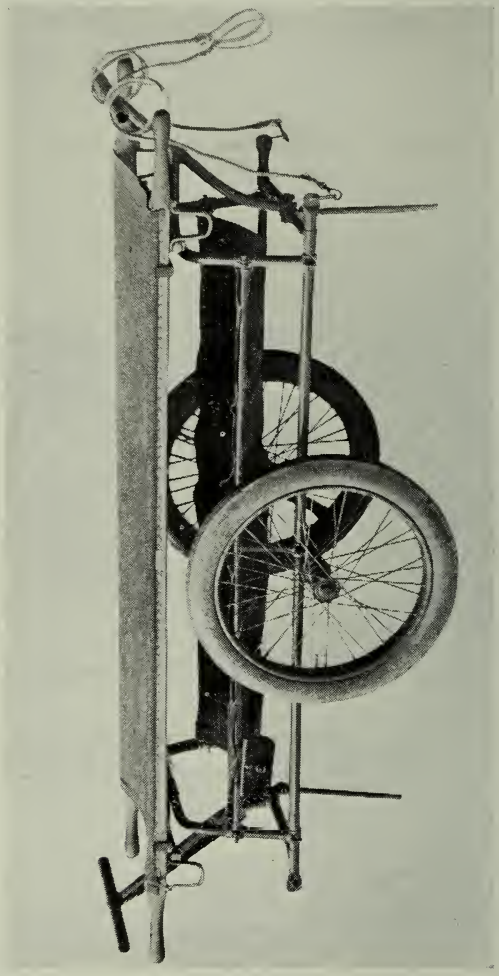


Fig. 42. The Furber field stretcher carrier.

In Italy an experiment was carried out at Genoa to test the efficiency of wheeled stretcher carriers in reducing the time taken for the transfer of sick and wounded from an ambulance train to a hospital. Ten Miller-James and two Furber stretchers were used, and 324 cases were evacuated in two and a quarter

hours ; the time usually taken without wheeled stretchers was three hours. This question of time might be unimportant when slight cases were evacuated, but it became of great importance in the evacuation of serious cases, such as fractured thighs.

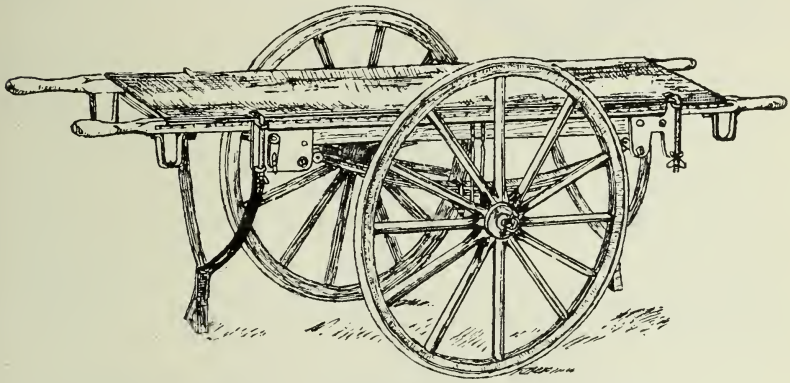


Fig. 43. The St. John litter under carriage (1915).

On all fronts, bad, muddy roads, unstable machinery, punctured tyres and other complications at times prevented wheeled stretchers being used, but there can be no doubt that generally they served a very useful purpose.

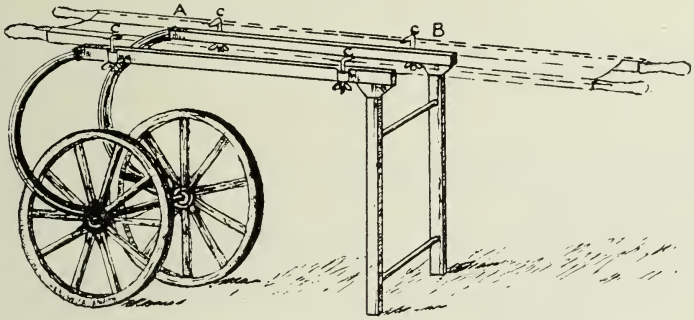


Fig. 44. The French type of double wheel stretcher carrier.

When the Lewis gun handcarts ceased to be used in France, the suggestion was made that they might be useful as stretcher carriers, and the Ds.M.S. of armies were asked to send to General Headquarters plans for their conversion. (Fig. 48.) One type was selected, and all armies were instructed by the Quartermaster-General to carry out the alterations suggested. The trials proved these converted carts to be very useful, but they were more suitable for carrying patients in casualty clearing stations than for use in front line units.

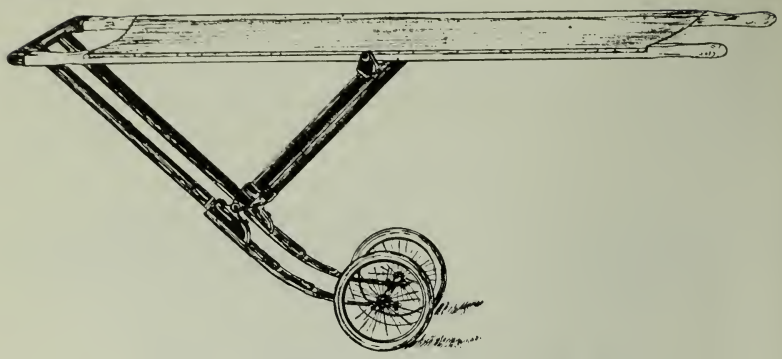


Fig. 45. The Kedstone wheeled stretcher carrier.

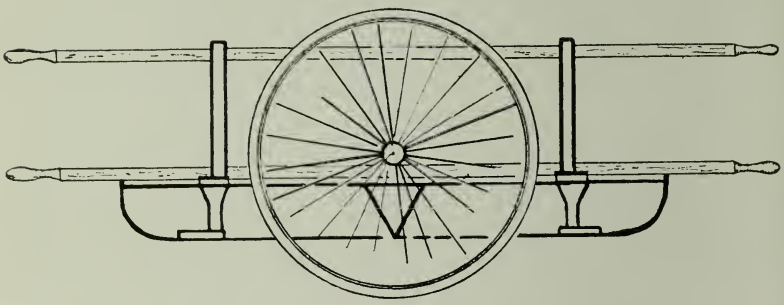


Fig. 46. The Parnacott bicycle stretcher carrier.

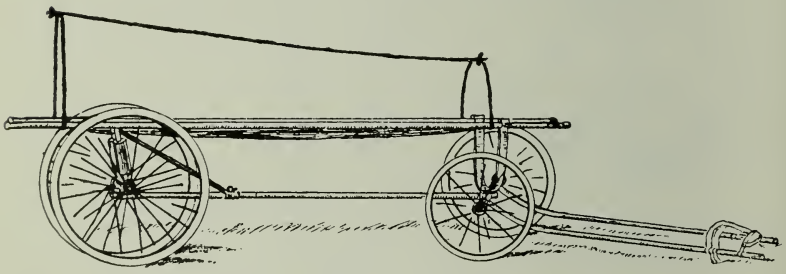


Fig. 47. The Puisais (French Army) stretcher carrier.

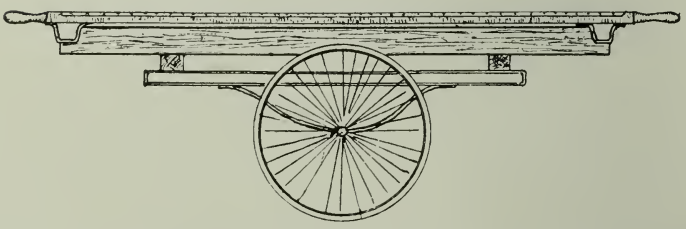


Fig. 48. Lewis gun hand-cart converted into a wheeled stretcher carrier.

WHEELLESS CONVEYANCES

Wheelless conveyances, carried or drawn by pack animals, for the evacuation of wounded on a large scale were chiefly used in Macedonia, Egypt, Palestine, Aden, East and South-West Africa, the Cameroons and Russia. Such conveyances are represented by cacolets, litters, travois and sledges, drawn or carried by mules, camels and other pack animals.

LITTERS AND TRAVOIS.

When the British Macedonian Force was first formed, it was essential to economize in transport, with the result that when operations commenced the maximum number of patients had to be carried with the minimum number of animals, drivers and attendants. The sick and wounded had sometimes to be conveyed five or six miles by hand before they could be transported in ambulance wagons. The ambulance transport of the force in Macedonia consisted of thirty pack mules with

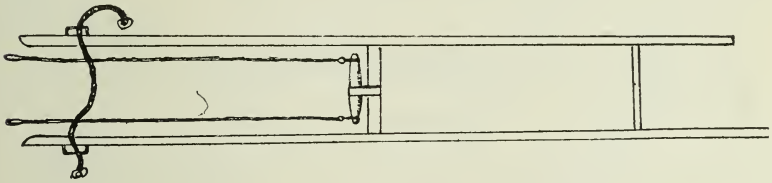


Fig. 49. The Greenleaf travois with swingle-tree.

cacolets for use with sitting cases, twenty for travois which required one mule each, and ten for litters which required two mules each for lying-down patients. A similar allocation of transport was made to mountain brigade field ambulances.

In view of the difficulties of transport, medical officers were instructed by the D.M.S., Surg.-General W. G. Macpherson, to experiment with types of appliances for carrying lying-down cases, and in January 1916 a demonstration of the various devices for evacuating sick and wounded was given. Among the types of appliances shown were the travois, litters and various improved methods of carrying wounded on pack animals.

Travois were generally constructed on the plan of the Greenleaf travois described in the R.A.M.C. Training Manual of 1911, and the most popular type was one fitted with a swingle tree. (Fig. 49.) It was claimed that this eased the pull on the mule, and prevented lateral motion. The length of the shafts were 18 ft. and 17½ft. respectively. Another useful type was made of green wood, and the design was similar to the swingle tree travois. Such travois were easily made and readily repaired,

but their use depended upon the proximity of trees, which were scarce in Macedonia. In hot weather the green wood dried up and became brittle, rendering the travois unsafe.

A travois with longer shafts than usual was used as a litter between two mules, one at each end of the shafts. Other litters of similar construction, but carrying two super-imposed stretchers, were also shown, and although ingenious in design and economical in that they required only one mule per patient, they were found when loaded to be too heavy for the beasts of burden. (Fig. 50.)

The increasing experience gained in methods of mountain ambulance transport proved the desirability of standardizing appliances, and the necessity of having ready means of constructing them. The shaping of the wood, if not supplied ready cut, occupied time, and required a higher standard of

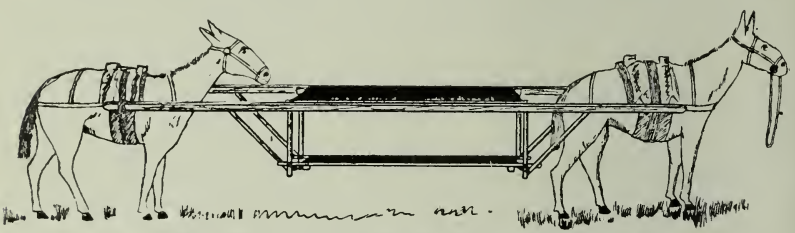


Fig. 50. Litter carrying two stretchers.

carpentry than was ordinarily found in the R.A.M.C. As no other service could spare mechanics for the work, the army ordnance department supplied ash wood shaped and cut to lengths, and a set of forgings and fittings for connecting the woodwork together. The appliances were assembled by the personnel of the field ambulances after a plan issued for their guidance, the official design being a travois-litter available for either purpose.

For each travois or litter four poles and two quarterings of ash or chestnut wood, and one set of forgings were required. Each pole was 14 ft. long, $3\frac{1}{2}$ by $3\frac{1}{2}$ in. thick at the thicker end, and tapering to 2 by 2 in. at the thinner end. The quarterings were 3 ft. long by $2\frac{1}{2}$ in. by 2 in. thick.

A set of forgings for making up the travois or litter and for supplying the necessary fittings consisted of :—

Steel stretcher loops, inside size $3\frac{1}{2}$ in. by $2\frac{1}{2}$ in., with ears drilled for $\frac{3}{8}$-in. bolts, each loop with $3\frac{1}{2}$ in. by $\frac{3}{8}$ in. bolts, nuts and washers	Two per travois or litter.
Steel clamp loops with plates and nuts, inside measurement $3\frac{1}{4}$ in. by $7\frac{1}{2}$ in. legs, threaded $2\frac{1}{2}$ in.	Four per travois or litter.

Steel plate shoes for travois 1 in. by 3 in. by 18 in., with six holes for fixing	Two per travois or litter and two spare.
Hooks, shanks 3 in. by $\frac{3}{8}$ in., with nuts and washers ..	Six per travois or litter.
Tug stops with two holes drilled and countersunk ..	Eight per travois or litter.
Bolts $5\frac{1}{2}$ in. by $\frac{5}{8}$ in. with nuts and washers	Four per travois or litter.

In practice the combined travois-litter did not prove satisfactory, because if used as a travois the long poles of the litter gave too much spring, with consequent discomfort, if not pain, to the patient. (Fig. 51.) One unit overcame this difficulty by converting a travois into a litter by using an extension pole.

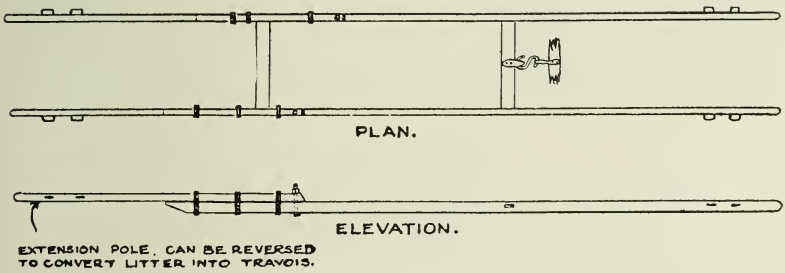


Fig. 51. Combined litter and travois.

It was deemed advisable, therefore, to make up travois and litters separately. The usual length for a travois was $17\frac{1}{2}$ to 18 ft., and for a litter 20 to 21 ft. When it was necessary to recess the clamps into the ash poles, as was sometimes the case, the recess was made about one inch from the end of the poles. If the recesses were made three feet from the end they weakened the poles. The sharp edges of the poles between the tug stops were rounded off in order that the shaft tugs should not be damaged.

As the equipment of a field ambulance on pack scales did not include a set of carpenter's tools, tools and materials were authorized.*

* One each of the following tools for issue to a field ambulance or mounted brigade field ambulance was authorized :—

Awls, blades, brad, $\frac{3}{32}$ in. ; awls, handles, brad, braces, carpenter's, ratchets without bits ; bits, augers, screw, solid wing, $\frac{5}{8}$ in. ; bits, gouge $\frac{7}{16}$ in. ; chisels, firmer, $1\frac{1}{4}$ in. ; gimlets, common, No. 6 ; screw-drivers, G.S., 14 in. ; spanners, double ended, $\frac{3}{8}$ in. and $\frac{5}{8}$ in. ; augers, screw, solid wing, eyed-$\frac{5}{8}$ in. with handles, could be issued in lieu of bits. In addition, 12 screws, iron, flathead, one $\frac{3}{4}$-in. gauge 12, and 16 of the $1\frac{1}{2}$-in. gauge 9, for each new travois or litter made up by the unit.

Ash wood proved highly satisfactory for the manufacture of travois, being springy and easily worked. The lengths were not bolted, but clamped together, which rendered assembling and repairing easy, as boring for bolts was unnecessary. Bamboo poles were tried as substitutes ; they had the advantage of lightness, but the supply was uncertain.

The ends of the travois poles were covered with short steel shoes, and a supplementary pair, lashed to the shafts of the travois, was added as a reserve, for it was found that the shoes wore away quickly. This condition would have been avoided if shoes of harder steel had been available for issue. At a later date 30-in. shoes were introduced, which by their greater length and breadth protected the ends of the travois and prolonged its life, and by lessening its flexibility kept the ends more off the ground and made haulage easier by diminishing the friction. When one end of the long shoe was worn it was reversed, thus doubling its life. (Fig. 52.)

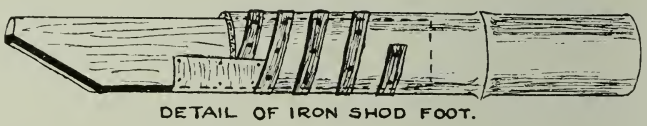


Fig. 52. Travois shoe.

Travois shoes wore out quickly on roads, but on sandy soil they lasted from 50 to 75 miles, the mileage of a month's work in semi-mobile warfare ; but on rocky hill paths they lasted only from 20 to 45 miles. In some ambulances tapered wooden plugs were fixed at the ends of the travois under the shoes ; this raised the ends and diminished the concussion transmitted to the patient when the travois passed over obstacles. The steel shoes were apt to cut or damage telephone wires laid along mountain paths in certain areas. Units, however, assisted the signal service by using tin plates or by removing these shoes and bolting on lengths of wood inside in passing over the wires.

As regards the relative advantages and disadvantages of travois and litters, officers at first with limited experience held divergent views, but with wider experience realized the necessity of maintaining both appliances in field ambulances, as the suitability of one or other depended on the nature of the ground. Where there was much undergrowth, for example on open hillsides covered with scrub oak, travois were unsuitable, and

the use of litters became necessary. Travois, however, could be used on mountain paths and could be guided round corners by using a drag rope, whereas a litter had to be dismounted and lifted round a corner. To obviate this, quarter locks

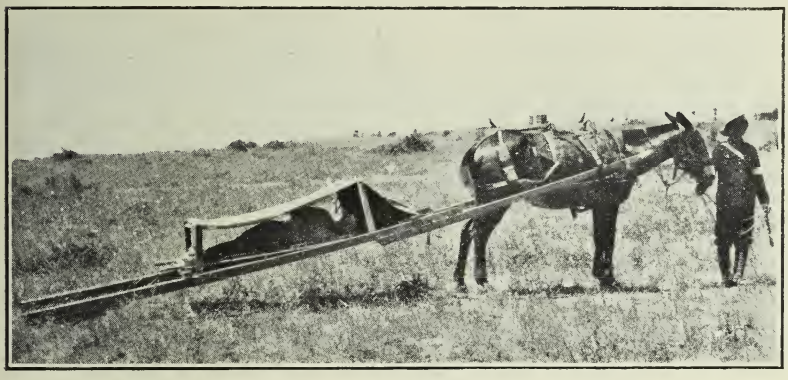


Fig. 53. Travois loaded.

were tried, but without success, as the apparatus tilted over when turning. Travois were more economical, in that one mule, one driver and one attendant served one patient, whereas litters required two mules, two drivers and one attendant per patient.

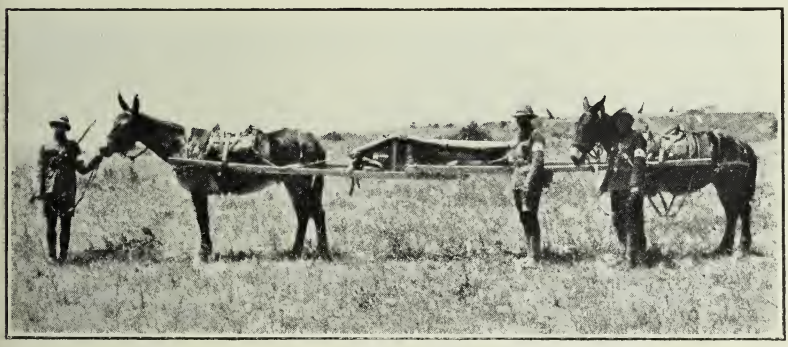


Fig. 54. Litter loaded.

A travois was much more comfortable than a litter, in which there was a certain amount of swaying. There was more likelihood of the mules bolting with travois than with litters, for if they attempted to bolt, the two mules with the litter never tried to get away in the same direction.

The maximum distance a loaded travois or litter could cover on uneven ground without changing mules was from three to five miles, and it was laid down that the drivers of travois should lead the animals and not ride on them, even when the appliances were not loaded, as the strain on the animals was considerable. The animals had to be strong, docile, well-trained, and 15 hands or over. On the march travois were unsightly and occupied a considerable length of road space. It was suggested that they should be carried in country or ambulance transport carts.

During the battle of Machukovo posts were established near regimental aid posts, and 600 cases were evacuated by sixty travois from these posts by mountain tracks to the advanced dressing station. The whole of this area was under shell-fire, but there was no trouble with the mules.

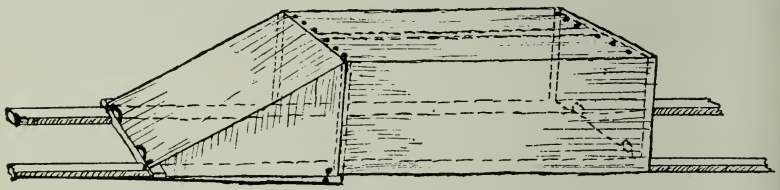


Fig. 55. Cover for travois or litter.

It was easy to arrange a shelter from sun or rain over the patient on a travois or litter by using bent twigs or forage bands, and a blanket, waterproof or bivouac sheet. (Fig. 55.) A method of carrying a patient in the Fowler position was devised for both conveyances.

MULE PACK TRANSPORT.

An endeavour was made to find a satisfactory method of carrying a patient on a stretcher either along a mule's back or across it (the "Arab" method). For the latter method a small mule was essential. The stretcher was placed across two basket panniers weighted with some heavy material, such as stones or earth, to keep them steady, and so adjusted that they were on a level with the top of the perch. Although there was little motion, the ends of the stretchers projected and the use of this method on mountain paths or on a crowded roadway was impracticable. A stretcher carried lengthwise caused discomfort to the patient on account of the motion. In both these methods the stretchers had to be steadied by an attendant. (Figs. 56 and 57.)

Frameworks were designed for such pack methods and were fitted on to the pack saddles, but they had the defect of raising the patients too high.

All these methods were found impracticable in Macedonia.

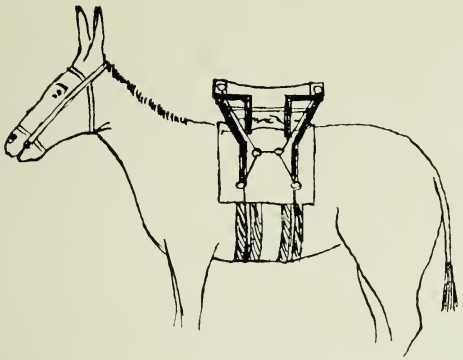


Fig. 56. Stretcher carried crosswise on a mule.

Riding Mules.—Riding mules were used to evacuate slight cases in the early stages of the campaign in Mesopotamia, Macedonia, Egypt, and some of the African expeditions.

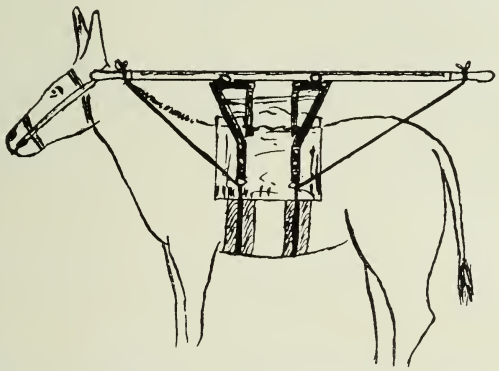


Fig. 57. Stretcher carried lengthwise on a mule.

Cacolets.—These were used in Macedonia and Egypt. In Macedonia cacolets were found to be too heavy for the small type of animal at first used. When larger and stronger animals were provided the usefulness of this form of transport became apparent. Cacolet transport was found to be quite comfortable for certain slightly wounded patients, and men have been seen asleep in their chairs. Although great care was taken to

prevent the apparatus from pressing on any wounded part, yet this was not always accomplished, and for this reason the appliances were more useful in transporting the sick. The animals considered suitable for this purpose were 14 hands high, sturdy and cobby, docile and well-trained. Considerable training was required both for the animals and for their drivers. As a pack saddle with a pair of cacolets containing two patients and kit usually averaged a total weight of 470 lb. the maximum distance which could be covered on uneven roads without changing mules was one and a half to three miles.

Loaded cacolet mules had each an attendant, as the patients ran serious risks if the mules gave trouble while passing other transport or turning a sharp corner on a mountain path.

Fig. 58. Regulation mule cacolet.

Mule Harness.—At first the ordinary pack saddle harness was used in Macedonia, but it soon became clear that special harness was required, as the breast piece was too narrow for draught work. Accordingly, a special set of saddlery was designed with the object of keeping the pattern such that the saddlery could still be used for riding purposes, or with cacolets, or other pack loads, and that it would be equally available for use with travois or litters. To ensure this, the design made use of a portion of the existing type, but the staples were removed from the arches of the G.S. pack saddlery, because they caused discomfort to a man when riding. When used for riding, some form of saddle pad with stirrups was improvised. A sheet

steel guide was rivetted to each side bar to hold the back band in place. The pack draught General Service pattern breast collar and neck strap replaced the pack saddlery breast collar, which was too narrow for use with travois. To prevent the pack saddle slipping, especially when used for pack work, the breast collar was connected to it by a preller hide rein on

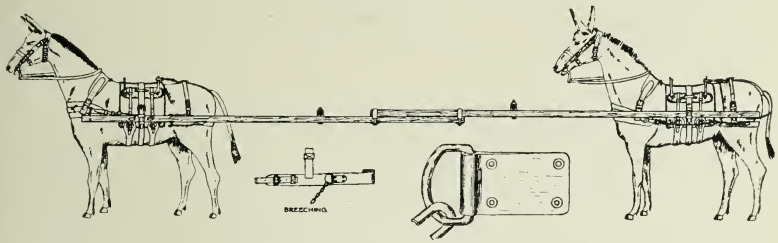
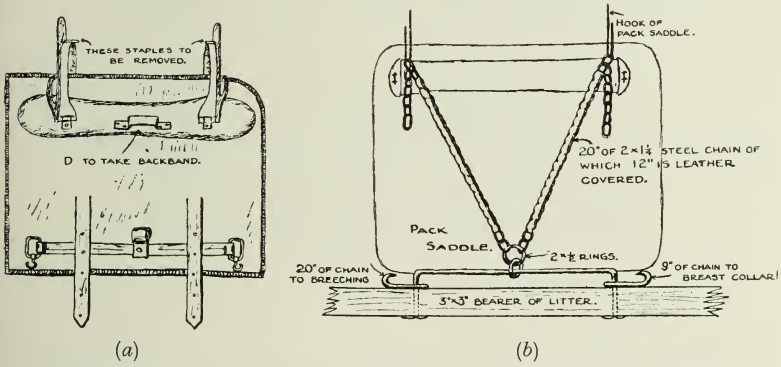


Fig. 59. Saddlery for litter.

each side, and looped through the D's on the breast collar and the D's on the front lower corner of the saddle. A back band, shaft draft, with two tugs working through the steel guides on the side bars, supported the shafts. The traces were the long wire pack draught General Service pattern, the short length only being used for a rear mule with a litter. Pack


THESE STAPLES TO BE REMOVED.
D TO TAKE BACKBAND.
HOOK OF PACK SADDLE.
20" OF 2×¼ STEEL CHAIN OF WHICH 12" IS LEATHER COVERED.
PACK SADDLE.
2" ϕ RINGS.
20" OF CHAIN TO BREECHING
9" OF CHAIN TO BREAST COLLAR
3"×3" BEARER OF LITTER.

(*a*) (*b*)

Fig. 60. Detail of saddlery for litter; (*a*) ordinary pack saddle; (*b*) pack saddle modified to carry litter.

saddlery breeching, G.S., with hip strap and crupper, was retained. A broader breeching would have been preferable, but it was not available. A steel D, 2 in. wide, was fixed to the breeching on each side just in rear of the slip strap by a leather loop rivetted on. Each D was fitted with a chain 16 in. long for the attachment to shafts of the travois or litter. (Figs. 59 and 60.)

CAMEL TRANSPORT.

Official camel cacolets were used by the Egyptian Expeditionary Forces during the first two years of the war (Fig. 61), but as they proved unsatisfactory numerous types of improvised cacolets were designed. Camel litters were also tried, but were not recommended and were rarely used, although it may be noted that they were used by the Germans in the South-West African campaign.

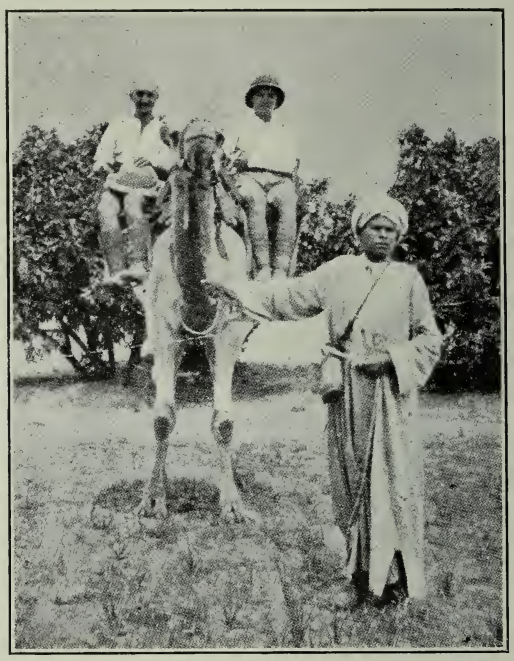


Fig. 61. Regulation camel cacolet for sitting patients.

Improvised cacolets for sitting and lying cases were designed for use in Sinai, and the plans are reproduced, but, although they served a useful purpose, they were not universally adopted. (Figs. 62, 63 and 64.)

The cot type of cacolet was copied from the Turkish pattern and was accepted as the official pattern. It could accommodate either a sitting or a lying-down case, and was manufactured first in wood and then in metal by the Ordnance Department. (Figs. 65, 66 and 67.) The number issued to each field ambulance was 48 pairs for lying cases and 102 pairs for sitting

cases, along with the following extra equipment for repairing damaged cacolets: Screw wrenches or screw keys to fit nuts $\frac{3}{8}$ in. at one end and $\frac{5}{8}$ in. at the other; bolts and nuts $\frac{3}{8}$ in. and $\frac{5}{8}$ in., 50 each; nuts $\frac{3}{8}$ in. and $\frac{5}{8}$ in., 50 each; pack needles 3, and string for repairing girth and neck bands; and spare parts—neck bands 20, girths 10.

Although the later patterns were more comfortable for wounded, no device did away with the swaying and jolting movements which are incidental to this form of transport and

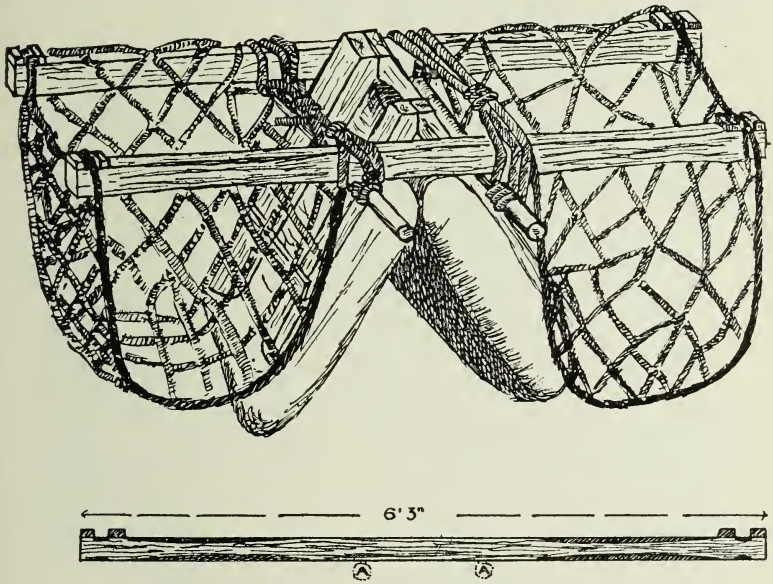


Fig. 62. Diagram of improvised camel cacolet for sitting patients.

so undesirable for the severely wounded. Articles of camel saddlery were designed to mitigate the pain and ill-effects of these movements. A special crupper rope was useful on hilly or slippery roads, but was of no assistance on level ground.

Medical officers in the Suakim Expedition of 1885 pointed out that the majority of camels belonging to field ambulances suffered from sore backs owing to ill-fitting saddlery being used. The same defect was noted in 1916, and medical officers attributed this to the continual change that resulted from the system then in vogue of parking camels with the camel transport corps of the respective divisions, and not with the field

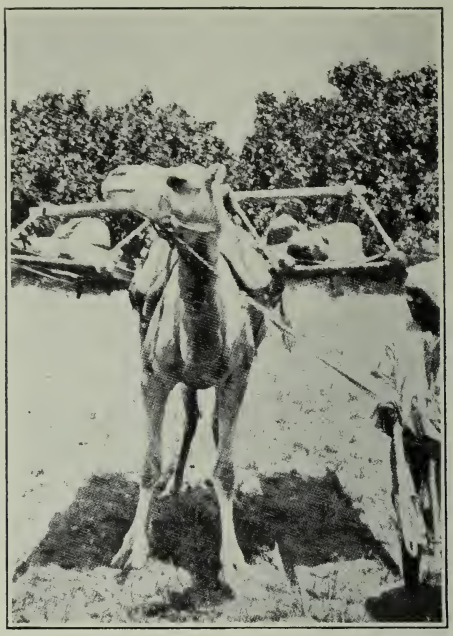


Fig. 63. Improvised camel cacolet for lying down patients.

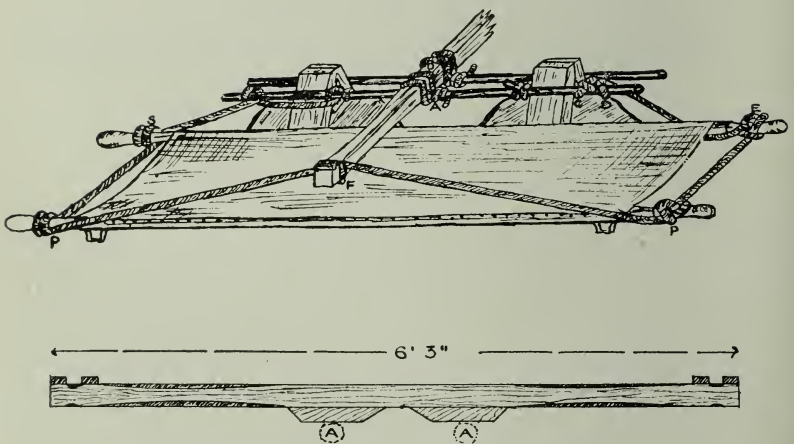


Fig. 64. Plan of improvised camel cacolet for lying down patients.

ambulances, to which they were only sent when required. The saddlery, however, was kept in the unit and was issued indiscriminately when the camels arrived. It was thus never certain that a camel always carried the same saddlery. This difficulty was overcome by the camel transport corps always sending the same animals to each unit and by attaching medical officers and men to the camel transport corps for training in transport duties. Officers in charge of unit transport carefully supervised the fitting of saddlery on each camel and then numbered both camel and saddlery with corresponding numbers. By using the same saddlery on the same camel the former

Fig. 65. Turkish pattern camel cacolet for lying down patients.

adjusted itself to the latter, and the number of sore backs was markedly diminished.

The value of the training of officers and personnel in transport duties cannot be over-estimated. In the mobile warfare of Sinai and Palestine the transport was the most important part of the field ambulance, the part, indeed, on whose services the success of the whole work depended. Any failure on the part of the mules, horses, camels, wagons or carts would have interfered with the efficiency of the unit. Recognizing this important fact, the transport personnel of the field ambulances took the greatest care of their mules, horses and camels—a care which was amply repaid in the success of their work in 1917 and 1918. To the experienced medical officer this was

nothing new, but the idea of personally supervising three or four hundred camels did not at first adapt itself to the views of the inexperienced and young officer regarding his medical duties.

Although camel cacolets entailed certain disadvantages to the patient, there were times when they alone could be used for the evacuation of casualties in some of the operations in the desert, and the number of camels employed in these expeditions was great.

In planning schemes for desert operations the difficulties of administrative medical officers were lightened by the knowledge that camels could each carry a 400-lb. load for hours or even days across the desert, averaging a speed of two to two and a half miles per hour, quite undisturbed by heavy shell-fire. Moreover, their moderate demands for water were satis-

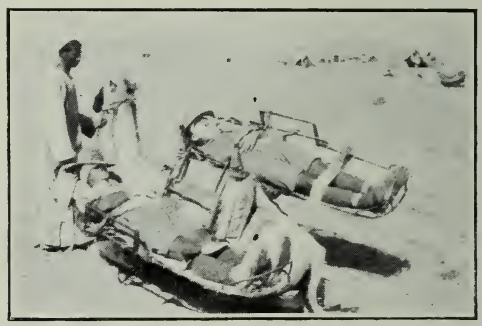


Fig. 66. British pattern of metal and canvas cacolet for lying down patients.

fied by a drink every second day, and if there was a shortage of water they could go four or even five days without it. This extended period between waterings, however, was never allowed if it could be avoided.

The report on the Suakim Expedition referred to above describes how camels loaded with wounded were kept in a square, and when shelling started they crowded together and the wounded were crushed. In the Sinai and Palestine campaign each animal had its own native driver. The camels were led across the desert in parallel files, and no accidents by crushing were reported. All medical officers concurred in expressing their admiration of the gallant conduct of the Egyptian *fellaheen*, who seemed to share with their dumb comrades the quality of brave and untiring effort, through the sun-blistered desert and under the death-dealing shell-fire.

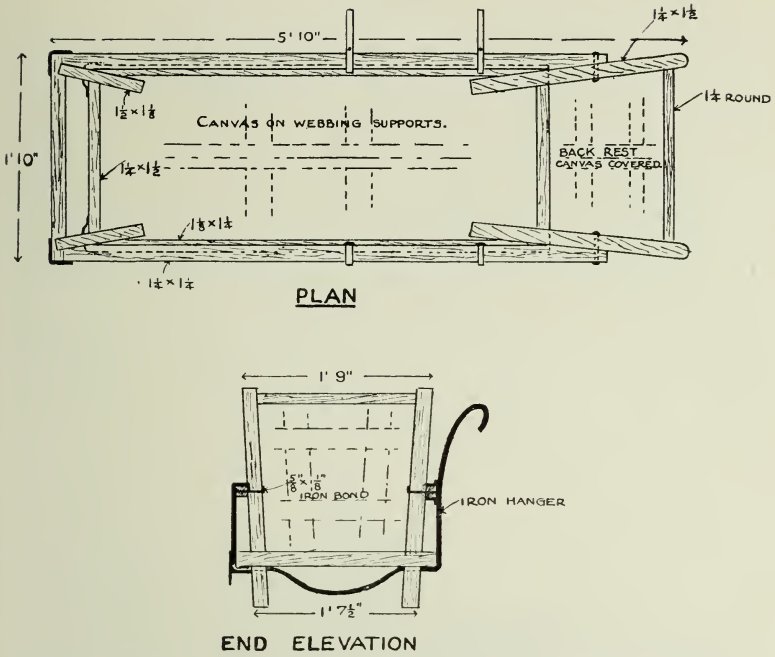


Fig. 67. Plan of Turkish pattern camel cacolet for lying down patients.

Fig. 68. Camel lying cacolet in use.

SLEDGES.

Sledges were employed in certain areas in Gallipoli and Macedonia, but they were never extensively used for the evacuation of sick and wounded in these countries. They were more useful in Sinai and South-West Africa, and were used to best advantage in Russia during the winter.

In Sinai the first sand sledges were designed by the Australian mounted troops operating there in 1916. Gradually the idea was developed and in a very few months every unit had invented or constructed a model of its own. The illustrations show the first pattern made by the Australians and the later or more standard type that was developed from it. (Figs. 69 and 70.)

These sledges made comfortable conveyances for certain

Fig. 69. Original pattern of sand sledge designed by the Australian Corps.

serious cases, such as abdominal wounds and fractured femurs, but they were easily overturned on uneven ground, and could only be drawn suitably by a mule. These disadvantages limited their usefulness, and the majority of medical officers after extensive trials of these appliances, came to the conclusion that the sand carts were better, and sledges were therefore relegated to the large camps and were used locally for removing lying-down cases from regimental aid posts to hospital.

In South-West Africa sledges with runners 12 to 18 in. wide were the best means of transport devised for getting over certain sandy wastes.

In Russia special ambulance sleighs were designed to carry two stretcher cases, but owing to considerable delay in manufacturing them, local sleighs were used to a great extent for the

evacuation of casualties. The type of sleigh used depended on the locality. Pony transport was employed in the populated areas where there were villages and good tracks, and where relays of ponies could be easily obtained. The local raised box sledges were the best types for use on the concave tracks beaten out by the ponies' hoofs. The bottom of the sledge was filled with hay, thus serving the double purpose of providing fodder for the pony and a comfortable cushion for the occupant of the sledge. The sick and wounded were wrapped in their fur lined sleeping bags. One pony could pull two men in addition to the driver for twenty to thirty miles a day and could continue doing so for several days on end. (Fig. 71.)

Reindeer sleighs were used principally over soft snow and rough ground. The use of reindeers depended on whether moss grew near the track, as the reindeer required no cover, and if

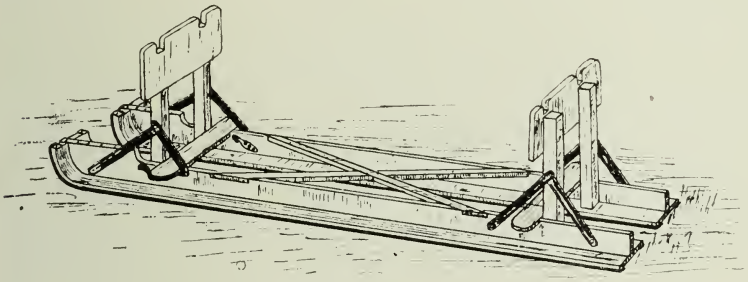


Fig. 70. Later pattern of a sand sledge.

taken at night to a moss bed needed no other fodder. They could pull a weight of 250 lb. for twenty to thirty miles a day, and could continue doing this for several days at a time. Reindeer sleighs were very fast and were suitable for evacuating serious cases to an operating centre. (Fig. 72.)

Dog sledges were used when pony or reindeer sledges were not available. They could move over any type of surface, and were specially suitable for hummocky sea-ice. Each dog could pull a weight varying from 80 to 100 lb. and only required 2 lb. of food daily. The disadvantage of this form of transport was that the dogs became easily tired when pulling the sledges over soft snow. (Fig. 73.)

When sledges drawn by ponies, reindeers or dogs could not be used man-haulage sledges were employed, and of all these the best pattern was the " Nansen " sledge. It was resilient and reliable, and an average man in good condition could pull a

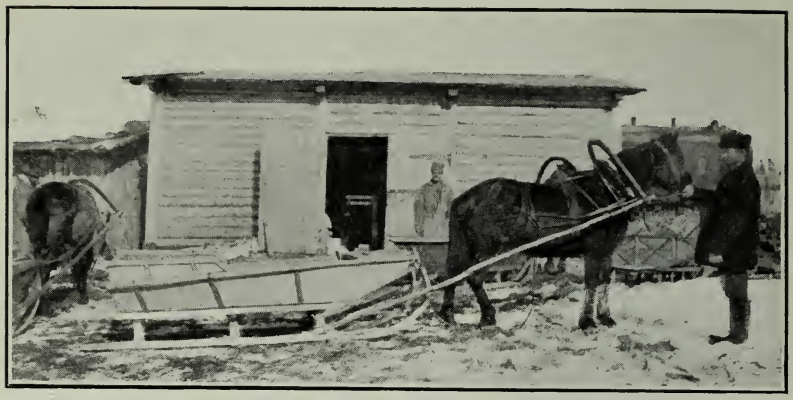


Fig. 71. Pony sledge, North Russia.

Fig. 72. Reindeer sledge, North Russia.

Fig. 73. Dog sledge, North Russia.

load of 150 lb. over a good surface for fifteen miles daily. The disadvantages were that this means of transport was very slow and that for each man a large amount of equipment had to be carried. (Fig. 74.)

The most important essentials in evacuating sick and wounded by sledges were provision of the quickest form of sleigh, a plentiful supply of rubber hot-water bottles, sleeping bags and fur clothes in order to conserve the body heat of a wounded man and diminish shock. The sleeping bags should be made as warm and light as possible, and the best material for them is reindeer skin. Such bags were carefully looked after and frequently turned inside out and hung up to dry to allow evaporation of body moisture. To facilitate nursing and dressing a

Fig. 74. Man haulage sledge, North Russia.

flap was cut in the back under the buttocks to allow a bed-pan to be used, and in front the bags were made to lace up to allow dressing of wounds without any unnecessary exposure. Purse-strings were provided for the foot of the bag, so that a perforation for the end of a Thomas splint could be made and then tightened to preserve warmth.

HORSED AMBULANCE WAGONS.

The Army pattern ambulance wagons in use at the beginning of the war were Mark V*, Mark VI, and Mark I Light. Field ambulances were equipped with ten Mark V* or Mark VI wagons, each drawn by two draught horses, and capable of carrying four cases lying down or twelve sitting up, or two lying down

and four sitting up. Cavalry field ambulances were equipped with four Mark V* or Mark VI wagons, each drawn by six draught horses, and six Mark I wagons, each drawn by two draught horses, and capable of carrying two cases lying down or eight cases sitting up. These wagons were the sole ambulance transport of field ambulances during the retreat from Mons and up to the time of the battle of the Aisne.

With the advent of motor ambulance cars on 16th September 1914, the majority of officers concluded that horse-drawn ambulance wagons would no longer be used as they were large and unwieldy, were conspicuous and offered a good mark to the enemy, were under-horsed, had a limited radius of work, and were very slow.

In October 1914 the field ambulances of the 8th Division, which were Territorial Force field ambulances, were equipped with seven motor ambulance cars and three horse-drawn ambulance wagons. In the same month the Army Council decided that henceforth the transport of field ambulances with the Expeditionary Force in France should be changed to this scale. The surplus ambulance wagons with their horses and personnel were to be returned to the base ; but as these wagons could travel over fields and rough ground cut up by shells, where no loaded motor car could move, it was decided to attach two of the surplus ambulance wagons from each field ambulance to the reserve parks, and the other five to the advanced horsed transport depôt. In this way a reserve of ambulance wagons, horses and personnel, was kept available in a suitable position for any advance that might take place.

The decision to retain the horse ambulance wagons was fortunate, as both the heavy and light wagons, but more especially the latter, served a very useful purpose during the Somme offensive in 1916. They were invaluable in the transport of wounded from places where there were no roads or where roads were either broken by shell-fire or impassable owing to the mud.

In 1918, too, the wisdom of this decision was again evident. By April of that year a reserve of 240 motor ambulance cars had gradually disappeared and the question of replacing them caused great anxiety. It became more and more difficult to meet the numerous demands for motor ambulance cars to take the place of those which had been damaged by shell-fire or had broken down mechanically. There was no hope of getting new vehicles for some time, and there was also a shortage of petrol. It became necessary, therefore, to make every effort

to conserve the supply of motor ambulances, and to this end the Quartermaster-General urged the most rigid economy in their use and recommended all armies to employ horse ambulance wagons wherever possible, and to avoid using motor transport in forward shelled areas.

In other theatres of war horse ambulance wagons proved useful. In Mesopotamia, when the Tigris Force was endeavouring to relieve Kut in March and April 1916, the horse ambulance wagons of the 7th Meerut Division assisted in evacuating over 2,500 wounded from the battle of Dujaila on 8th March. Again, in April, during the Aiessa operations, it was a convoy of Mark V* and Mark VI wagons belonging to the above division and to the 13th British Division which evacuated the sick and wounded to the field ambulances, which were acting as casualty clearing stations.

While, however, these Mark V* and Mark VI wagons could be used to advantage in the plains of Mesopotamia, they proved useless in the mountainous country of Macedonia, and were withdrawn from field ambulances. In their stead, ten light (Mark I) wagons were issued and, when motor ambulance convoys were unable to evacuate casualties from the field ambulances to the casualty clearing stations owing to the snow-covered and ice-bound roads, convoys of horse ambulance wagons of this type were organized and proved most efficient.

In Italy also Mark V* and Mark VI ambulance wagons proved unsuitable for the mountain roads, and they were replaced by the light wagons.

The light (Mark I) wagons were tried in Egypt, and when fitted with sand wheels proved useful in the desert.

New War Establishments for the forces in France were prepared in June 1918 for a cavalry field ambulance, and in September 1919 for a field ambulance. The former unit was allotted four motor ambulance cars and six light ambulance wagons, and the latter unit seven motor ambulance cars and two ambulance wagons.

The question of the under-horsing of ambulance wagons was frequently raised on account of the great difficulty experienced by cavalry field ambulances in bringing up personnel and equipment when in action. The A.Ds.M.S. of cavalry divisions drew attention to the fact that a fully loaded ammunition limber weighed 22 cwts. and was drawn by four horses, whereas a fully loaded light ambulance wagon weighed 26 cwt. and was drawn by two horses. They pointed out that when a cavalry formation moved into action, all the heavy transport vehicles, including

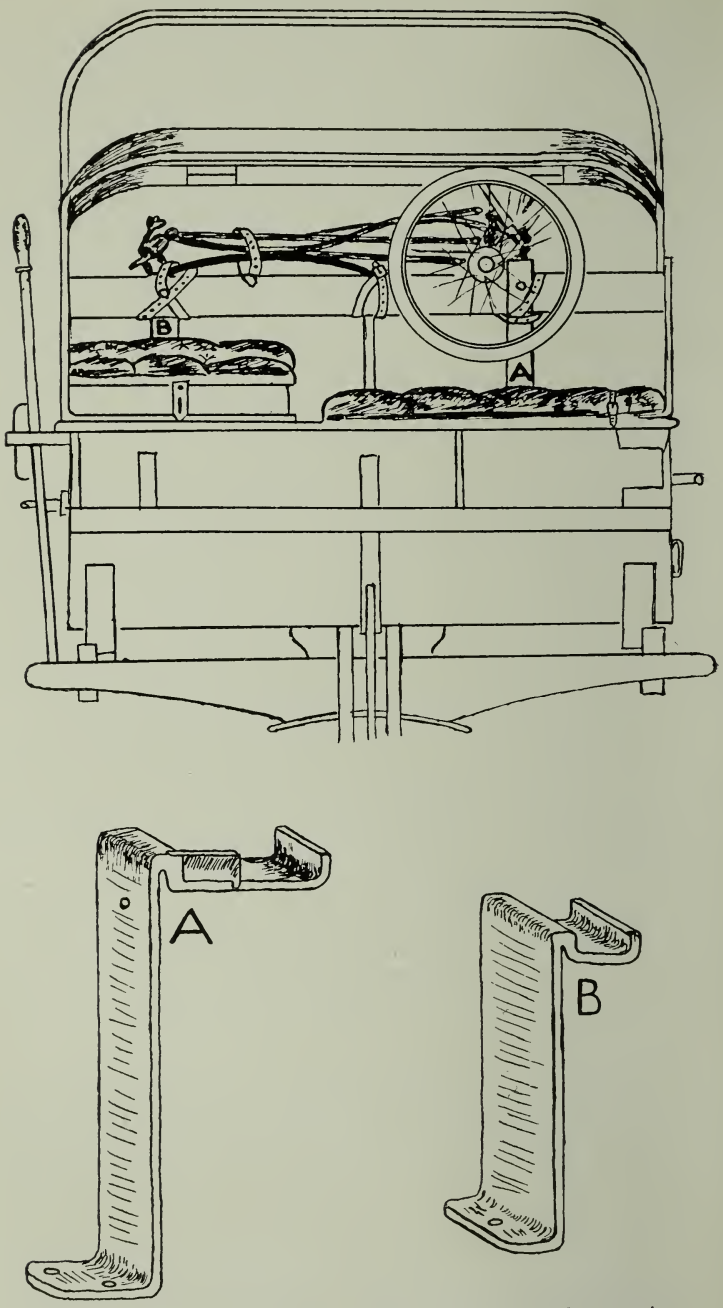


Fig. 75. Method of carrying a Miller-James stretcher carrier in a Mark I light wagon.

the G.S. wagons of cavalry field ambulances, were left in the back areas. Consequently light ambulance and limbered G.S. wagons were used to carry the personnel and equipment of a cavalry field ambulance during an advance, but they could only carry half the required personnel and equipment, and there were no means of obtaining stores from the distant heavy section. Moreover, the light vehicles had to follow wherever the cavalry advanced, carry a full load of ambulance personnel, be ready to return with the wounded, and repeat this procedure so long as operations continued. The result was that the horses became utterly fatigued and were unfit for work over an extended period. These difficulties were also noted in other theatres of war. It was consequently suggested that the number of light ambulance wagons should be increased from six to eight, and

Fig. 76. Rapid transit one-horse ambulance wagon.

provided with four instead of two horses, and that three G.S. wagons should be exchanged for five G.S. limber wagons. This scheme provided two cavalry field ambulance sections, each with four ambulance wagons, four limbered G.S. wagons and one water-cart. An alternative scheme suggested was to exchange the three G.S. wagons for two 30-cwt. motor lorries, one of which could carry the equipment and the other the personnel, and assist afterwards in evacuating the slightly wounded.

Few suggestions for altering the construction of the wagon were submitted. The hoods were lowered to make the wagons less conspicuous, and in tropical countries they were covered with matting as an additional protection against the sun. Cavalry field ambulances in France adopted the method illustrated in Fig. 75 of carrying one wheeled stretcher in each light horse ambulance wagon.

The experience generally of horsed ambulance wagons during the war tends to show that the construction was suitable ; that the heavy wagons, Mark V* and Mark VI, were useful for carrying front line casualties at certain periods and in certain theatres of war and were always useful in bringing sick from billets ; and that the light ambulance wagons (Mark I), proved

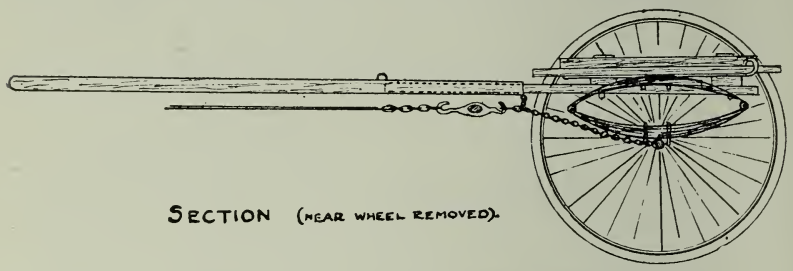


Fig. 77. Section of rapid transit one-horse ambulance wagon.

useful at all times. It was, however, the unanimous opinion of medical officers in France and in other theatres of war that all wagons were under-horsed, and required four horses to each vehicle.

Rapid Transit Ambulance Wagon.—A rapid transit one-horse ambulance wagon, similar to that shown in the R.A.M.C. Training Manual, was used in Sinai and Macedonia, and found useful for accompanying cavalry or parties which were detailed to raid villages. (Figs. 76–78.)

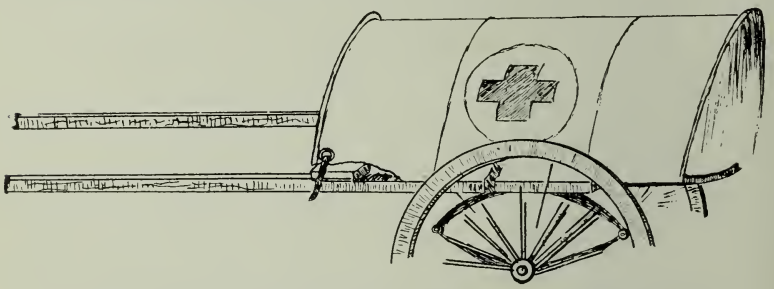
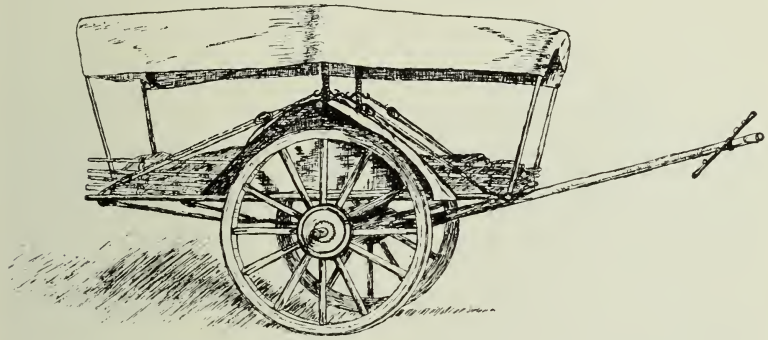


Fig. 78. Rapid transit one-horse ambulance wagon with hood.

TONGAS.

Benares Ambulance Tongas.—A complete unit of twenty specially constructed bamboo tongas with two excellent ponies for each was presented by H.H. the Maharajah of Benares for use in Mesopotamia. The unit consisted of 2 Indian officers, 62 Indian other ranks, 55 ponies, 20 tongas and 2 transport

carts. These tongas could move rapidly over the ground with the minimum amount of discomfort to the patients. The system adopted was for the canvas bed to be slung from side supports, and the jolting caused by the movements of the animal to be reduced by springs attached to the tonga bars. (Fig. 79.) The principle was good and much was expected of these tongas for rapid work with the cavalry. Unfortunately the tongas were made of indifferent material and rapidly broke down. It was found that they would not be of any use across country until new wheels, new axles and new cross-bars had been supplied. In course of time these were supplied, but even then no reliance could be placed on the tongas. In answer to an inquiry from India concerning them the following



BENARES TONGA.

Fig. 79.

wire was sent on 30th January 1917: "Principle may be good but the material is flimsy and weak, and the workmanship is bad. We have tried the tongas with A.T. axles and wheels, and new tonga bars, but they have proved a failure. What remains of this transport is being tried for station use and on roads."

Bullock ambulance tongas accompanied the field ambulances with the Indian Expeditionary Forces to Mesopotamia, East Africa and Aden. They were drawn by two oxen, and on smooth roads, such as are found in India, the average speed was one and a half to two miles per hour. They were absolutely unsuitable for active operations in the field, and when other transport became available they were withdrawn from field ambulances and sent to the lines of communication stations for station duties.

IMPROVISED AMBULANCE WAGONS.

General Service Wagons.—G.S. wagons were used in the earlier days of the war in France and were suitable for sitting-up cases. They were similarly used on other fronts, and in an emergency were always useful. In Mesopotamia they had to be used for the lying-down cases in the retreat from the Dujaila Redoubt in March 1916, when over 2,500 casualties were evacuated in one convoy. There an attempt was made to ensure for the patients a partial bed of tarpaulins, but it was impossible to provide cover or to make them comfortable.

Fig. 80. Sand carts moving across the desert.

Although the severely wounded suffered intensely during a long and tiring journey there was no other transport available, and if the G.S. wagons had not been used the patients would have been left on the field of battle to the care of the Turks or to the tender mercies of marauding Arabs.

Army Transport Carts.—The army transport cart is the chief form of army transport in India. It is a springless two-wheeled cart with an iron network frame for a floor. It was used in Tsingtau, Macedonia and Mesopotamia for the evacuation of wounded. In Tsingtau the medical personnel had sufficient time and material to make the carts comfortable for lying-down cases. In Macedonia an apparatus for suspending one stretcher on each cart was designed and used. Carts equipped with

this apparatus accompanied raiding parties. In Mesopotamia they were used along with the G.S. wagons in evacuating casualties during the retreat from Dujaila. No suspension apparatus was used and it was impossible to cover the iron bar flooring with sufficient bedding. Patients suffering from fractured thighs and legs started the journey with their fractures securely immobilized, but in a very short time the constant jolting and shaking disarranged the splints. The patients suffered severely, and all who took part in the retreat describe such a method of evacuating serious cases as extremely cruel and bad.

Fig. 81. Sand carts, showing wagons parked and wheels boxed.

Desert Carts.—Field ambulances operating with the forces in Egypt, Sinai and Palestine had to contend with the same difficulties as had been experienced by medical units serving with expeditionary forces in previous campaigns in Egypt, in designing suitable appliances for the evacuation of sick and wounded. The narrow-wheeled regulation pattern ambulance wagons were useless as the wheels sank in the sand and the horses could not move the wagons. As the result of experiments, desert ambulance carts, or sand carts as they were popularly called, and sand sledges were designed. The former were ideal for moving cases from advanced dressing stations to field ambulances and casualty clearing stations, and were known to cover a distance of forty-five miles in one day. They were used for the removal of serious cases and as often as possible for the transport of slightly wounded. (Figs. 80–82.)

At first, ten desert carts were issued to each field ambulance, but as this number was reported inadequate, and as it was the method of selection for evacuating cases, the supply was increased to twenty-two per unit.

The desert ambulance cart was a two-wheeled spring cart with a canvas hood, fitted with a spring bottom and drawn by four mules. By placing two mattresses over the spring bottom a comfortable conveyance was made for two or even three lying-down cases. The wheels were fitted with metal tyres nine to twelve inches in breadth to increase their surface and thus prevent their furrowing deeply into the sand. Although these tyres eased the traction and made it possible for four mules to draw the conveyance, it was frequently necessary to employ six mules when the sand was very soft.

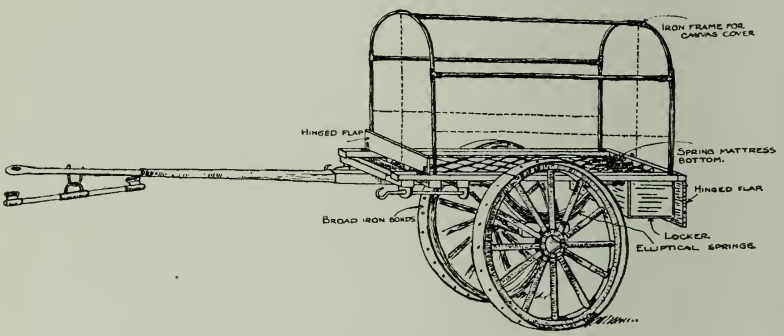


Fig. 82. Diagram of a sand cart.

Further experiments were made with a view to easing the traction, and in October 1916 it was thought that success had been obtained by boxing the wheels. This was an arrangement which closed in the wagon wheels and prevented the sand from flowing between the spokes and gathering on the rim and so impeding their revolution. The final opinion in April 1917 was that this method had many disadvantages, and units were allowed to remove the boxing. The reports that guided the administrative officers to this decision stated that if the wheels were boxed in tin they were too conspicuous in the sunlight, and if encased in wood and made properly sand-tight, they were of little help to the animals in deep sand, and were particularly cumbersome on going down an incline, as they did not get such a good grip of the ground and were apt to slip or skid.

It was found that the carts became damaged in crossing ground intersected by cracks and ditches. To obviate such damage each field ambulance was supplied with twelve picks and shovels for use in filling in cracks and smoothing uneven ground. To facilitate the repair of damaged wagons the unit was also allowed to draw one small saddler's repair outfit. These small additions to the equipment of the unit served a useful purpose in keeping the vehicles in a fit state for the evacuation of wounded during long and rapid advances such as took place in Palestine.

When empty, the carts were used for transporting equipment to the advanced dressing station, and in an emergency they could be easily loaded and the mules harnessed up very quickly. In one unit it took only twenty-two minutes to turn out the transport personnel in the middle of the night and despatch a convoy of seventeen sand carts from El Arish to the aid of the Australian Mounted Division after they had defeated and captured a large body of Turks at Magdaba.

MOTOR AMBULANCE CARS.

The introduction of motor ambulance transport into extended war areas not only made the clearing of casualties easier and quicker, but also affected the prognosis in serious cases by bringing them more rapidly and smoothly to a medical unit where operation and after-treatment were possible. Even in a confined area like that of Gallipoli a few motor ambulance cars proved of very great value.

The decision in September 1914 of the General Headquarters, France, to form motor ambulance convoys and equip each with fifty ambulance cars, and also to allot a certain number of cars to divisional and corps headquarters has been recorded.*

After the decision had been made in October 1914 to introduce motor ambulance transport into the equipment of field ambulances, the following establishment was allotted gradually to divisions :—

Field Ambulances.		*Motor Ambulance Workshop Unit.*	
Motor ambulance cars ..	21	Motor workshop lorries ..	2
Motor cycles	3	Motor car	1
M.T. A.S.C. personnel ..	45	M.T. A.S.C. officer.. ..	1
		M.T. A.S.C. other ranks ..	18

The Indian divisions had five field ambulances, and each unit received four motor ambulance cars, one of which was a

* *See* Vol. II, General History Medical Services, Chap. XIV, pp. 291–3.

Ford, instead of the seven cars authorized for the field ambulances of the British divisions. Several A.Ds.M.S. considered that the number of cars allotted to the field ambulances was insufficient and asked for an additional car. The increase, however, was not sanctioned.

While this reorganization was taking place it was impossible to specialize in any one make of car, as the War Office could only send to France whatever cars were available. In 1914, 324 were despatched, and 1,405 in 1915. In addition certain units received gifts of motor ambulance cars from private individuals, societies and firms at home and abroad. All cars on arrival in France were registered and given a War Department number. Units were equipped in this way at first with several varieties of the following different makes of cars: Austen, Buick, Clement-Talbot, Crossley, Daimler, Dennis, Fiat, Ford, Mors, Napier, Panhard, Renault, Rolls Royce, Sheffield Simplex, Siddeley Deasy, Straker Squire, Studebaker, Sunbeam, Vulcan, Wolseley. The difficulty of obtaining spare parts necessary for the efficient running of these cars proved a strong argument in favour of having motor ambulance cars made to a standard pattern.

With these cars on the road experience in mechanical and body structure was gained, and faults were noticed in the springing, clearance, lighting, carrying accommodation for stretcher and sitting cases, canvas covering, ventilation, screens, and padding of seats.

It was recognized that motor mechanics was a progressive science and that many of the chassis were not originally designed for motor ambulance bodies. The chief points of interest from the experience of motor ambulance transport during the war was the evolution of the two essentials required, namely, reliability and smoothness. Reliability depended not only on the design and manufacture of the car, but also on its being kept in proper running order, and smoothness included not only even running but ease in loading, facilities for attending cases in the car if necessary, a warm, well-ventilated atmosphere inside the body, interior and exterior lighting, and some means of communication between the attendant inside and the driver outside. In fact, smoothness included everything that had a beneficial effect on the patients.

Some of the early faults which militated against reliability and smooth running were overhang of the body and defective springing. When the springs were weak they either broke or caused dangerous swaying; when they were harsh, and

more especially if associated with solid tyres on the wheels, they caused severe bumping which was injurious both to the patients and to the interior of the car. Sometimes delay was caused by cars with insufficient clearance getting stuck on uneven roads. Some other minor defects were also noted. There were no trap-doors in the floor of the body to facilitate cleaning of the chassis. Certain cars could not carry

Fig. 83. Interior of motor ambulance car.

the number of patients for which they were designed. The bodies were painted different colours. Some were white and thus conspicuous to the enemy ; these could not be used until repainted. The canvas in some cases tore easily and was neither wind nor water tight. The interior of the body was not designed for easy attendance on patients during a journey. The seats were narrow, the padding inferior and uncomfortable for

sitting cases. There was no speaking tube, and the ventilating arrangement was defective. The driver's seat was not protected, and the tool boxes and petrol racks were not conveniently placed. These faults, which were by no means improved by over-loading and over-driving, were gradually rectified and the new cars sent out from the United Kingdom were constructed as follows :—

Samples of all material, other than wood and steel, were submitted for approval. All wood used was of the best quality and free from knots and shakes.

The body was framed up in well-seasoned best ash, which included all hoops, centre body rail and back step ; and was strengthened with mild steel plates.

The best white wood was used for all floor boards and running boards.

A strengthening rail of ash was fitted across the body where the stretcher bearer legs were supported.

The body was mounted on the chassis on well-seasoned best ash runners, and was secured with bolts through the runners and chassis frame. Grover spring washers were fitted to all holding down bolts.

The body was covered with best quality grease-proof khaki duck, and the cover was arranged to exclude all draught. The material was satisfactorily fastened with a half-round metal moulding secured with wood screws.

The wings were fitted with four moulded 20-gauge lead-coated steel wings. The front ones had outside lips and inside shields, assembled so as to clear shock absorbers if these were fitted. All were fitted with hand-forged stays.

Suitable tool box and petrol can rack were fitted, and provided with padlocks.

The upholstery at the back of driver seat extended to the bottom of the cushion and both cushion and squab were well padded with hair. These were plain, not buttoned, and were covered with a good quality leather or approved substitute. All available space under the seat was utilised for lockers with hinged lids.

Side doors of grease-proof khaki duck of good quality were required ; the front edge was fixed to the edge of the dashboard with a metal strip over. The rear edge was stitched round a 5/6 in. rod ; the bottom end rested in a suitable socket and the top was formed into an eye to which was attached a spring and finger hook. The whole was rolled up and securely fixed to dash when not in use.

A driver's apron of grease-proof khaki duck of good quality was fixed permanently to the edge of the dash and extended downwards for eight inches at each side over the side doors. A metal strip was fixed over the dashboard edge. The apron was of such a length as to come up to the driver's chin and clear the steering wheel. At each top corner a strap to hook on to the side of the canopy was firmly stitched and held in position by means of a spring similar to that used for the side doors. Straps were fitted to the dash to secure the apron when it was rolled up and not in use.

The floorboards were extended outside the chassis frame to make up the space to the edge of the side doors and from seat to dash ; that on the driver's side had room for the proper operation of the change speed and brake levers.

On some chassis, when it was necessary to extend the dashboard upwards and at each side, the extension was framed and well secured to the existing dashboard.

A folding step was fitted to the back of the vehicle.

The whole vehicle was so constructed that the minimum noise and vibration were experienced by the occupants both when the vehicle was travelling over any class of roads and when it was stationary with the engine running.

The chassis and exterior of the body, driving boards, running boards and wings, were painted with at least two coats of service colour, over one coat of lead colour, the second coat of service colour containing a small quantity

of varnish mixed with it to give a better finish to the paintwork ; each coat was thoroughly dry before the next was applied. The Geneva Cross was painted on a white circular ground on each side, on the back of the body, and also on the top of the driver's canopy. The words, " Load not to exceed 1 driver, 1 attendant and 8 patients " were painted in white on the forward bottom corner of each side of the vehicle. The whole of the interior of the body was painted with a leadless white enamel paint.

All metal faces were secured with bolts and Grover spring washers were fitted under the nuts.

The principal measurements of the interior of the body were : Length, 8 ft. 2 in. by 5 ft. 4 in. high by 5 ft. 9½ in. wide at side line.

The interior lining of stout enamelled canvas was fitted and carried round the end of the framing and secured with half-round metal moulding.

All corners and angles in the interior were rounded to prevent the accumulation of dust and dirt, and to facilitate cleaning.

The stretcher supports were made to fold up quite vertical when not in use. Suitable buffers were fixed to the top rail to assist in minimizing vibration and rattle. Countersunk metal sockets were provided in the floor boards to accommodate the legs of the stretcher supports. All stretcher support brackets were of the three-leg pattern, and all the joints were secured in a special manner.

Cast sockets were fitted to hold the stretcher handles in place at the front end, and suitable staples and straps 34 in. by 1 in. were fitted to the back end to hold the stretchers in position.

The ambulance fittings were made to take four regulation pattern field stretchers of the following dimensions : length over handles 7 ft. 9 in., length over canvas 6 ft., width 1 ft. 11 in.

A space of 15 in. between the stretchers was given to allow an attendant to pass along the car. The interior accommodation was arranged in such a manner that the car accommodated four patients lying down on stretchers, or two lying on stretchers and four sitting on the seat, or eight sitting on the seats.

An attendant's folding seat was fitted to the front end of the interior. All the seats were provided with backrests. Bandage boxes were fitted under the attendant's seat.

The seats and backrests were upholstered with leather or an approved substitute and stuffed. The seat cushions were plain and not buttoned, and were held in position by leather straps.

An arm sling was provided at each side of the car, over the top stretchers. The sling was made of webbing, and covered in the same material as the seats and backrests.

A flexible speaking tube two feet long was arranged between the attendant's and driver's seats.

All the floor boards were covered with linoleum and had trap doors made over the back axle and gear box. These were held in place by sunk turn-buttons or other suitable methods.

A matchboard partition was provided between the back of the canopy over the driver's seat and the body. This was covered with the same material as the interior lining, and fitted with celluloid windows 14 in. high by 10 in. wide. The window was wood framed and opened inward from the top and was provided with a strap to hold the window in any position, and with a turn-button to secure it when closed.

All bolts inside the body were countersunk flush or covered with moulding. The bolts were fitted to all body irons ; wood screws were not used.

The roll-up back curtain was secured by six brown leather tongues, 1 in. wide, passed through approved staples. The slot on the curtain was cut out of the material, and had a 3 in. by 3 in. pad of brown leather sewn on the outside and round the hole. The curtain was pleated down the middle and provided with 5/16-in. brass eyelets and lacing cord, so that the width was adjustable. A ½-in. eyelet was fixed in the bottom corners.

Straps were provided for holding the stretchers in place when they were stored on the floor of the car.

Special orders were issued to units that :—

(1) No structural alteration was to be made in a car without authority ;

(2) No officers other than those belonging to the A.S.C. M.T. were allowed to drive a motor ambulance car ;

(3) The driver of every car had to have a pass and keep a log book, and note down the amount of petrol received and the mileage run ;

(4) Speed limits were not to be exceeded. Near the front line the speed limit was five miles per hour, to prevent raising a dust that might inform the enemy that traffic was moving on the roads. In the rear areas the speed was ten miles per hour, as this was agreed to be most economical for the life of the car and most comfortable to the patients ;

(5) Cars were not to be used for " joy rides " or sent on unauthorized duties, and if sent outside the divisional area the driver had to have a statement from his commanding officer showing the number of the car, the duty he was on, the speed at which he was to travel, the starting point of his journey, and the occupants of the car.

(6) The cars were not to be kept waiting.

(7) Only one type of infectious disease was to be placed in each car.

(8) A report was to be sent in if any car was damaged, stating the duty on which the car was being employed, the locality of the accident, the name of the driver, the cause of the accident and who was responsible.

Instructions were also issued regarding the care of cars, describing *inter alia*, the method of preventing water freezing in the circulating system during frosty weather.

During 1914 and 1915 the field ambulance cars were kept in running order by the field ambulance workshop unit, which was attached to one of the field ambulances in the division. Drivers of the ambulance cars were under the dual control of the officer commanding the field ambulance and the officer commanding the field ambulance workshop unit. They were under the orders of the former in so far as all ambulance work was concerned, but were under the jurisdiction of the latter in everything connected with the running and cleanliness of the engine and chassis of the car. The field ambulance to which the workshop unit was attached indented for the petrol, oil, grease, spare parts and all stores for all the motor ambulance cars of the division and the stores were issued by the workshop unit.

The workshop units worked extremely well and were of very great service to the force. Medical officers will recall many instances when, but for such a unit, cars would inevitably have been lost and the evacuation of front-line casualties considerably delayed. It is sufficient to record one example of this. Between 22nd April and 10th May 1915, while the second battle of Ypres was in progress, the 28th Divisional Workshop Unit not only retrieved fifteen cars which had been damaged by shell-fire, collision, or by falling into shell-holes, but also sent out men to relieve the field ambulance drivers, exhausted by day and night work, to change tyres and to keep cars in running order.

By February 1916, owing to the need for economy with efficiency it was decided that the retention of a divisional ambulance workshop unit was unnecessary, and that equal efficiency would be obtained by the transfer of the artificer personnel with their two- or three-ton workshop or store lorries to the divisional supply column. When a division was on the move and the field ambulances were a considerable distance away from the headquarters of the divisional supply column, the ambulance workshop unit could easily be detached with its personnel, to work in close proximity to the field ambulances, and still be available to attend to the needs of the motor cars of the divisional headquarters. This change effected a saving in each unit of three drivers, one motor-car, and one lorry. There was strong opposition to this scheme by divisional A.Ds.M.S. but their recommendations for retaining the unit were not agreed to.

Further improvements in the motor ambulance bodies were considered, the most important being the provision of some heating apparatus for the interior of the body. The method most commonly adopted was to carry the exhaust pipe throughout the length of the body, along the floor and out through the rear opening of the car. It was protected from the woodwork by a covering of asbestos tape and a perforated metal shield. These measures also prevented the patients' legs and kits from coming into contact with the hot exhaust pipe. At first it was thought that the smell and fumes from the exhaust would be drawn back into the interior and so upset the patients, but, after a few experiments this was obviated, and this method of warming was finally adopted. Electric radiators and other forms of heaters were tried but were not universally used.

The interior lighting of the ambulance cars called for improvement. The number of ambulance cars at the front not fitted with electric light in the latter half of 1916 was 1,187. Many

different kinds of lamps had been tried without success and it was agreed that some form of electric lighting was necessary, and this was provided in the later pattern of cars.

Several suggestions were made for improving the exterior lighting of cars for night work. In one division the divisional authorities allowed motor ambulances to have a shaded electric light mounted on the front axle. This light was worked by a switch on the dash-board and threw its beam on the road in front of the right front wheel. The risk of collision and of accidents to the wounded were minimized in this way.

In one motor ambulance convoy luminous paint plaques about 10 in. by 5 in. were fitted on to the rear of the ambulances and proved very successful for convoy work at night in positions where no lights were allowed. It was recommended and agreed that these should be provided for all ambulances.

The suggestion to replace rear flaps by doors was not adopted owing to the extra weight thereby put on the cars and the length of time necessary to provide and fit them on all ambulance cars.

One division suggested painting the insides, canvas and wood-work of the bodies with water paint instead of with oil paint, thereby saving both time and expense as the paint dried a few hours after application, and the car was ready for the road. This suggestion was adopted.

Experimental cars for transporting special surgical cases after operation were constructed and sent out from the United Kingdom. They were given a trial but proved unsuccessful.

To economize in the use of cars, trailers were suggested and designed; they were not popular, however, and did not come into general use.

The number of cars out of action in France from time to time was very considerable, especially in 1918. For example, 273 in May 1918, 306 in June, 323 in July, 319 in August, 305 in September, 427 in October, 528 in November, and 819 in December, were unfit to take the road amongst those allotted to armies in the field.

The number of cars out of repair was intimately bound up with the question of the supply of spare parts. This was always a difficult question not only in France but in the other theatres of war, and how difficult it was may be estimated by the figures on the following page.

Number of Ambulance Cars at Home and Abroad.

	Supplied by the War Office up to 13th May 1917.	Supplied by the British Red Cross Society, 1914-1918.
France	3,698	2,386
East Africa	287	15
Macedonia	292	61
Mesopotamia	170	130
Egypt	309	14
Malta and Gibraltar	64	23
India	50	—
United Kingdom	1,011	531
Italy	—	167
Russia	—	52
Serbia	—	8
Aden	—	3
	5,881	3,390

In February 1916 there were 352 different types of mechanical transport vehicles in France and 281,000 different kinds of spare parts, none of which were interchangeable.

In considering what cars were most useful for the different theatres of war, the nature of the country and of the military operations had to be taken into account.

In France the ordinary conditions of a European country disturbed by war existed, and such cars as the Daimler, Sunbeam, Wolseley and Austen proved to be the most reliable for ambulance work, while the Ford car with its carrying capacity reduced from four to two lying cases was always useful on bad roads and in advanced areas.

Considerable difficulty was experienced in Italy in evacuating wounded from the front line in the hills owing to the types of motor car available. They were old pattern Talbots, Sunbeams and Daimlers, which had comparatively small radiators, were of low horse-power, were high geared and were too heavy to ascend the hills. As the result of experiments the D.D.M.S of the Italian Expeditionary Force recommended that 25–35 horse-power Fiats were the most useful on mountain roads and suggested that the standard British pattern of body should be altered and should be made lower, 6 in. less in width, and much lighter.

In Macedonia field ambulances were not supplied with motor ambulance cars, as there were no suitable roads over which they could run between advanced and main dressing stations.

For motor ambulance convoy work along a limited number of roads Sunbeam cars proved most efficient. Two devices, the Coleman-Newell sling stretcher and the Clark-Doherty suspension apparatus, were designed for the transport of serious cases in motor ambulance cars. They were very useful for carrying fracture cases and seriously wounded over rough roads.

Cars were not allotted to field ambulances in Egypt and Palestine as they could only be used on a limited number of roads and on special tracks made in the desert by laying down rabbit wire netting. The varieties found most useful in France proved suitable for motor ambulance convoy work.

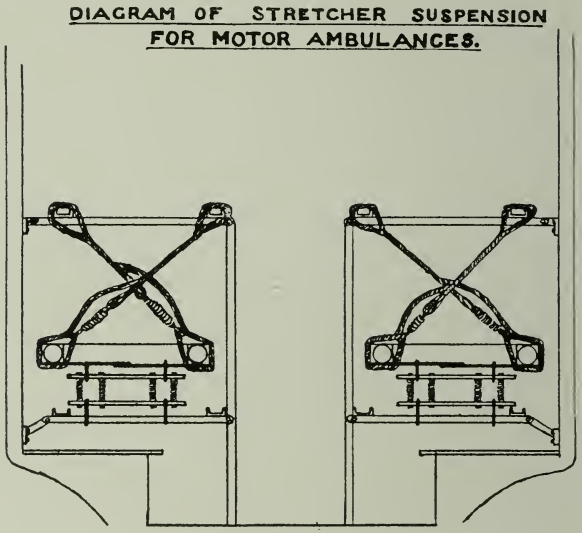


Fig. 84.

The advisability of using light, high-powered ambulance cars does not appear to have been considered prior to 1916 in Mesopotamia. The question was then raised by Surgeon-General Treherne, the D.M.S. of the Force. Consequent on his representations, application was made in July of that year for 164 cars, the Ford pattern being considered most suitable. Eventually field ambulances and motor ambulance convoys were supplied with these cars. The former units were equipped with three Ford ambulance cars for lying-down cases and two Ford touring cars for sitting cases. This type of car proved most

useful as the desert in many parts of the country was firm and suitable for light, high-powered cars with good clearance. They were easily man-handled across *nullahs*, did not destroy light Arab bridges, were able to move in mud, could negotiate the narrow streets and sharp corners of the town bazaars and offered a small target when employed on front-line work.

Star cars weighing 2 tons 6 cwt. were tried but proved too heavy and had too low a clearance. They were unsuitable for the desert, and the light pontoon bridges used in certain areas could not support them. They were tried in the Nasiriya area and were ultimately used for local work in the Basra base. The Ford ambulance cars in Mesopotamia carried two lying and one sitting or four sitting cases, in addition to the driver. The touring cars carried three sitting in addition to the driver. Kits belonging to casualties were not carried if the vehicles were loaded to their full capacity.

During the hot weather months the ambulance cars were lined with *chetai** or fabric as an additional protection from the sun. Once the Persian frontier was crossed new conditions arose resembling those on the Italian front. The hilly roads were difficult and tortuous, and in many cases dangerous Here the slipping gear of the Ford had many disadvantages over the fixed gear of the ordinary car.

In other eastern theatres of war light high-powered cars with a high clearance were also considered the most satisfactory.

MOTOR LORRIES AND BUSES.

At the beginning of the war, motor omnibuses and motor ammunition and supply lorries were used in France for the evacuation of serious cases. Afterwards they were used on all fronts for evacuating the slightly wounded only.

CABLE RAILWAYS.

The teleferica or miniature cable railway was chiefly used by the Italians during their battles on the mountains, and occasionally by the British forces operating in Italy for the evacuation of seriously wounded patients. It consisted of a double line of steel cables from 1,000 metres long stretched up the mountain side to a height of 600 metres. The cables were suspended from frame pillars or standards at intervals. Electric swinging cages 3 ft. broad and 6 to 12 in. deep were used.

* *Chetai* is a kind of reed matting.

They were made of perforated sheet steel and were about 7 ft. long, one cage going up and the other coming down. These cages were slung on a deep grooved trolley-wheel and drawn by a smaller and lighter cable wound over a rolling drum. (Fig. 85.)

Small stations consisting of a platform and station-house were situated at convenient sites at the end of each section. The station-house sheltered the gasoline engine which drove the drum. The cage lay alongside the little platform, and the patient was placed in it and sent down the line. On the lines used for the evacuation of wounded there was usually only one transfer station, but on other lines used for stores, supplies and ammunition there might be four or five.

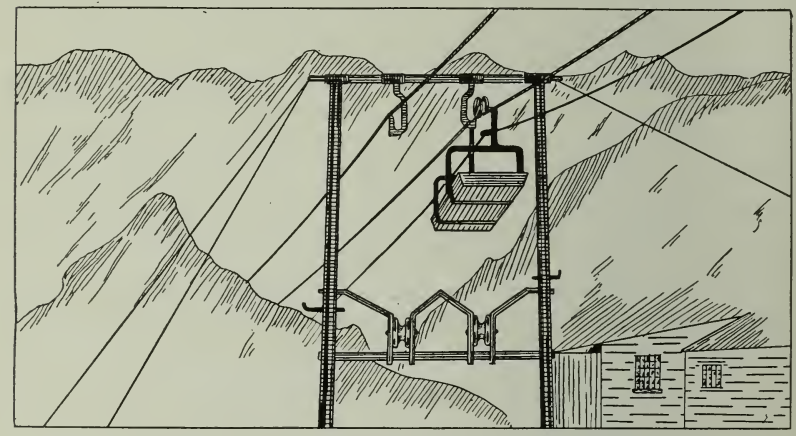


Fig. 85. The teleferica railway used in Italy.

The advisability of erecting a teleferica in the mountainous districts in Macedonia occupied by British troops was also considered.

AMBULANCE TRAINS.

According to Field Service Regulations one ambulance train, which would be timed to leave railhead at a fixed hour, was to be mobilized for each division, while the R.A.M.C. Training Manual described several methods of improvising supply trains for use as ambulance trains.

Ambulance trains were used in all theatres of war. The first ambulance trains used were more or less improvised but they were gradually replaced by specially constructed trains. In the earlier trains patients were carried on field stretchers

suspended on frames. The later trains, specially constructed in England, left little to be desired to facilitate the treatment of patients. These trains were run to different ports for embarkation to France. Sometimes a special siding from the station to the dock had to be laid before each coach averaging 57 ft. long and weighing from 26 to 30 tons could be raised from the rails, slung over the side and lowered on to the deck of the transport. The transports carried at first two long bogie coaches on deck and latterly four. As every port had not

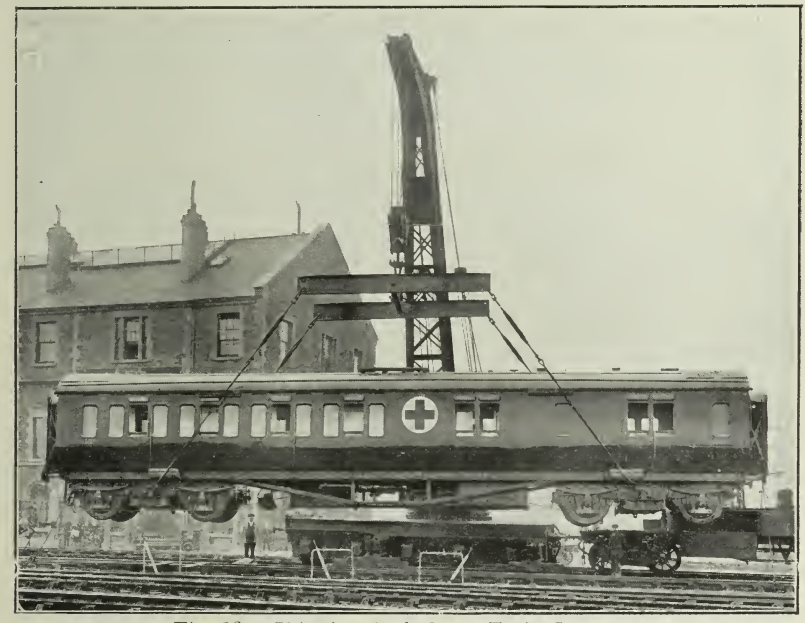


Fig. 86. Shipping Ambulance Train Coaches.

a crane suitable for this purpose, Dover, the London docks, Tilbury and Portsmouth were used in succession. From January 1915, gangs of expert railwaymen accompanied the first trains and unloaded them at Boulogne and Dunkirk, but at a later date one gang was stationed at the port of embarkation and another at Boulogne or Dunkirk. On the opening of the Channel Ferry, the ambulance trains were sent across to France by it.

The ambulance trains were mobile hospitals complete not only in medical equipment but in medical personnel, stretchers, supplies and stores for use on the trains and to meet the emergency demands of Ds.M.S. during active operations. They were

used not only to evacuate the cases from the front area but also to permit of treatment of the wounded during the journey.

While administrative medical officers and consulting surgeons outlined what was required and official instructions were drawn up for officers commanding ambulance trains and orders issued for extra medical or surgical equipment, it was left to the Ambulance Train Advisory Committee in France and the Ambulance Train Sub-Committee at home to provide suitable trains. The former committee was established in November 1914 and consisted of a field officer of the R.A.M.C., a field officer of the British Railway Traffic Directorate and an officer representing the French military railway authorities. It was dissolved on 26th March 1917. The Ambulance Train Sub-committee was formed in January 1915. This Sub-committee was composed of Sir Francis Dent, as chairman, Sir Wm. Forbes and British railway carriage superintendents on the different railways in the United Kingdom. After the Advisory Committee in France was dissolved, Captain Hosken advised the Ambulance Train Sub-committee regarding ambulance train requirements in France. Through the co-operation of these committees the different problems that presented themselves from time to time were settled.

Each train was marshalled to carry definite numbers but could be organized to convey more cases according to the severity of the fighting, as follows :—Maximum lying, normal 300, pressure 400, crisis 500 ; maximum lying and sitting, normal 500, pressure 600, crisis 700 ; maximum sitting, normal 600, pressure 700, crisis 800. By using this sliding scale, it was possible to relieve the congestion of the forward areas.

At certain garage stations train supply stores were established, and all ambulance trains were then replenished, as occasion demanded, with rations, comforts, linen, stores and ordnance equipment.

The D.M.S. of the British Expeditionary Force on arrival in France, in August 1914, asked that the six ambulance trains which had been authorized for the force should be composed as follows :—

1 brake van for baggage and equipment ;
10 covered wagons for 120 lying-down patients ;
2 brake vans for baggage and equipment ;
6 covered vans for 72 lying-down patients ;
1 composite carriage for hospital staff ;
7 covered wagons for 84 lying-down patients ;
2 brake vans for baggage and equipment ;
10 covered wagons for 120 lying-down patients ;
1 brake van for baggage and equipment.
Total vehicles 40, to carry 396 lying-down patients.

The wagons for the lying-down patients were fitted with four Brechôt-Desprez-Ameline frames, and each frame supported three lying-down cases. Nos. 4 and 5 Ambulance Trains consisted of third-class Nord passenger coaches with part of the fittings removed so that these coaches could each carry four of the frames and could accommodate thirty-two sitting-up cases. No. 6 Ambulance Train consisted of corridor communicating coaches.

These trains were found insufficient and on 11th September three more were requisitioned, and eventually No. 7 was formed in September, Nos. 8 and 9 in October, and No. 10 in November 1914. While these trains were being formed in France from French stock, the War Office sent out a train composed of British rolling stock. This was No. 12 Ambulance Train, which arrived in Boulogne on 22nd October, but it was not allowed to run until 12th November 1914. The British Red Cross Society also formed a train in France. This train was No. 11 and started to run on 15th December 1914.

By September 1914, experience in the running of the improvised trains mobilized for use with the original expeditionary force had brought out the following points. The two-axle covered wagons fitted with Brechôt-Desprez-Ameline frames, although more convenient than passenger stock for lying-down cases, were uncomfortable. There was no inter-communication or automatic brakes. There was no form of heating. Medical officers and sisters could not visit, or if necessary redress the patients en route. There was no sleeping or messing accommodation for the personnel of the train. Cases to the extent of 40 per cent. did not require lying-down accommodation. Accordingly, the D.M.S. asked that the composition of the trains might be changed to :—

1 brake van for baggage.;
2 covered wagons for 108 lying-down patients ;
1 brake van for baggage ;
6 covered wagons for 72 lying-down patients ;
1 brake van for stores ;
3 carriages for medical staff, personnel and sitting cases ;
1 brake van for medical stores and rations ;
7 covered wagons for 82 lying-down cases ;
1 covered wagon for baggage ;
9 covered wagons for 108 lying-down cases ;
1 brake van for baggage.
Total vehicles 40, to carry 372 lying-down cases and about 80 sitting up cases.

It was further decided to attach to each ambulance train one wagon-lit sleeping car and one dining car, one truck for medical comforts, stretchers, and blankets, and special coaches for sick and wounded Indians.

No. 12 Ambulance Train, which was sent out from England, was made up of fourteen converted bogie brake vans. Ten of these were fitted up as lying-down ward cars with beds in tiers of two. Each coach carried twenty patients. One van was fitted up in a similar way to carry twenty attendants, and three vans were fitted up as pharmacy, kitchen and store cars. In France one French bogie composite coach for medical officers and sisters and one *fourgon* were added to the train. The carrying capacity of this train was 200 lying-down cases. Three English civilian railwaymen, designated the secretary, fitter and electrician, were sent out with the train from England, but as they were civilians and not subject to military discipline they were sent back to the United Kingdom in December.

British Red Cross Train No. 11 was composed of twenty-two vehicles fitted up with Furley cots, and had lying accommodation for 206 patients. One wagon-lit dining car was added to the train at the end of December. When this train was taken into use general instructions were issued to define the conditions under which any ambulance train provided by the British Red Cross Society was to be used for the transportation of sick and wounded.

The Advisory Committee put forward a scheme to divide up the stock already on the trains formed in France, so that each train would not be composed of stock belonging to more than two French railways. This was necessary as trains composed of stock of numerous different railways did not run well, and there was difficulty and delay in getting trains repaired, as the various companies owning the stock had workshops at different places in France. This reorganization took many months to accomplish as it was difficult to get trains together at one place. Ultimately three trains, Nos. 1, 4 and 6, were composed entirely of one company's stock. The remaining seven trains were composed of stock from two companies as one of the French railways had supplied very few inter-communicating vehicles, and these had to be combined with communicating vehicles of another company. Two or more wagon-lit coaches had been fitted to each train and were used for the staff, pharmacy and kitchen. They were removed from the ambulance trains in July 1915 and returned to the wagon-lit company. They were replaced by other vehicles. In order to make the trains composed of French passenger coaches more convenient for carrying patients, seats and partitions were removed or cut down, but such alterations were stopped

in April 1915. Two *fourgons* in each train were fitted up as kitchens, at first with Soyer's stoves, and later with kitchen ranges, shelves, cupboards and meat-safes.

The carrying accommodation for lying cases was gradually increased, and the upper berths were provided in the ordinary carriages by fixing stretchers above the seats. This was improved by fitting a sort of cantilever bracket for carrying stretchers, and ultimately wooden brackets were fitted by the Royal Engineers. These were an improvement on the stretcher frames, as they took up less room and stretchers could be laid on them instead of having to be threaded through. Eventually brackets, shelves, cupboards and partitions were fitted on these French trains.

Four trains were provided by voluntary funds, namely, No. 14 by Lord and Lady Michelham, No. 15 by the Princess Christian Fund, and Nos. 16 and 17 by the United Kingdom Flour Millers' Association. Certain cars were added by the War Office to Nos. 14, 16 and 17. The interior design of these trains led to considerable correspondence between the Advisory Committee in France and the Ambulance Train Sub-committee in London. The Advisory Committee in France held meetings on the 3rd and 16th December 1914, and put forward the following recommendations regarding the construction of the ambulance trains :—

The length of train should not exceed 300 metres.

The weight of train should not exceed 500 tons (gross).

The trains should provide for lying-down and sitting-up cases in the proportion of 1 to 2.

No special ward was required for officer patients.

Two kitchen coaches were considered essential.

The stock to be provided to be that generally known as " wide stock."

Each kitchen to be capable of providing 50 gallons of hot water at a time.

Emergency candle brackets to be provided in each ward car—not less than eight per car.

A six-gallon tank for drinking water, capable of being emptied and cleaned, with a padlock for the top and cover to be fitted in each ward car.

An independent form of heating (such as the Thermo-Syphon of the Nord Railway) to be provided in the staff and personnel living cars.

All stock to be fitted with Westinghouse brakes.

No train to bear the number " 13."

Quarters to be provided for three medical officers, four nursing sisters, and personnel varying from 45 to 55.

The provision of storing accommodation for linen, packs, clothing and kits, and reserve stores for field units.

The provision of a mortuary, operating room, pharmacy and surgery.

Coaches for isolating infectious cases must be at the end of the train.

Seating to be of the easiest description, and suggested to be upholstered in American cloth.

A latrine bucket with wooden seat and hinged lid to be fitted in the lavatory compartments.

At another meeting early in 1915, the Advisory Committee recommended that beds in ward coaches should be in tiers of three instead of two as in No. 12 Ambulance Train; that the tare weight of trains should not exceed 450 tons; that all stock should be able to travel round a curve of 150 metres radius; that infectious coaches should be sub-divided, so as to admit of at least two kinds of infectious cases; and that baths and mortuary were not required.

In March 1915, M. Grappier, Carriage and Wagon Inspector in Paris, visited England and inspected the trains under construction (Nos. 14, 15, 16, and 17), and recommended that no part of the underframes of coaches should be less than 20 cm. above the rail level; that all coaches should be provided with safety chains and that buffer faces should be 340 mm. in depth.

In April 1915 the Ambulance Train Sub-committee at the War Office were asked to supply four more ambulance trains, Nos. 18, 19, 20 and 21, and in May four other trains, Nos. 22, 23, 24 and 25. Two brake-van coaches were supplied with each of these eight new trains, one as a brake van and store, and the other as a brake van and lying infectious ward. The French railway authorities stipulated that a space of 15 ft. must be set apart in each van for the use of their officials, 5 ft. for guards on duty and 10 ft. as a living compartment for the French train staff. An air-tight partition between the guards' living room and the infectious ward was also insisted on.

It was now decided that the composition and the lettering of these and all future ambulance train coaches for the Continent should be as follows:—

T. Brake van and store.
A. Kitchen.
B., C., D., E. } Ward cars (lying-down).
X. (If a fifth ward car provided—to be lettered X.)
F. Pharmacy.
G. Staff.
L., M., N., O., P. } Ward cars (sitting-up).
H. Kitchen.
R. Personnel.
S. Brake van and lying-down infectious ward.

Total, 16 bogie vehicles.

Weight not to exceed 442 tons and length 300 metres.

The decision to provide only four lying-down wards out of nine, was apparently due to the 1914 recommendations of the Advisory Committee in France that the accommodation should provide for sitting-up and lying-down cases in the proportion of two to one.

Intercommunication was to be throughout the train, except to the guards' sections.

One of the five sitting coaches (P) was to be devoid of upholstery, so that it might be used for infectious cases when necessary. In the staff car it was decided to have seven compartments; three for medical officers; two for sisters, one for an officers' mess, and one for a sisters' dining room.

It was also decided that all trains should be electrically lit throughout on the Stone's system, capable of generating at low speed; that instead of the Furley cots provided on Nos. 14 to 17 trains, which cost £1,000 per train, a type arranged by the Great Western Railway should be fitted, as they were lighter, 17 lb. less per bed, and equally good; that the London Warming and Ventilating Company should supply the kitchen ranges; that the self-heating arrangement for staff and personnel cars should be the Dargue-Griffiths' system; that blinds or curtains should be supplied for all windows and that the minimum width of gangway openings should be 2 ft. 4 in.

The War Office desired the railway companies to supply mattresses and pillows throughout the trains, as well as office tables, operating table, and safes. A list of "spare parts" was drawn up, to be considered as part of the original equipment of each train.

It was finally decided in France to marshal these and all future trains in the following order :—

S. Brake and infectious lying ward.
G. Staff.
A. Kitchen and store.
B. Ward.
C. ,,
D. ,,
E. ,,
F. Pharmacy.
L. Ward.
M. ,,
N. ,,
O. ,,
P. Infectious ward.
H. Kitchen and men's mess.
R. Personnel.
T. Brake and store.

The following difficulties were experienced after these trains had been put into service. There was only one lavatory in the staff car for both medical officers and sisters, at the sisters' end of the car. This was remedied by placing the medical officers' compartment next to car S, so that medical officers could use the lavatory on that car. The Dargue-Griffiths' heating pipes were both fitted near the roof and did not prove suitable for railway carriage heating.

By November 1915, sixty additional beds were supplied to No. 12 Ambulance Train and fitted into position, thus increasing the lying accommodation from 200 to 260. A bogie staff car and a four-wheeled personnel car replaced the Nord railway staff coach and one French *fourgon*. In the following month half of the original car for personnel was converted into a ward car and this increased the carrying capacity by twenty beds, giving a total capacity of 280. In July one four-wheeled coach for infectious cases was attached to each of Nos. 14, 15, 16 and 17 Ambulance Trains.

In 1916 six more trains, Nos. 26, 27, 28, 29, 30 and 31 were supplied. These trains were only provided with one ward coach for infectious cases, and the remainder were equipped for lying cases, as the lying accommodation could be converted into sitting although the sitting could not be converted into comfortable lying accommodation. Provision was also made for a shower spray in the staff car lavatories, a bed seat in the officers' mess, more ventilation in the lavatories, lower foot-boards set out to French running dimensions, clasps and padlocks for main electric light switches, gauge glasses to show the amount of water in each overhead tank and upper berths in infectious ward sitting coach P. As a result six considerably improved trains were provided, each consisting of :—

8 ward cars (lying-down) B, C, D, E, L, M, N, O.
1 infectious car (sitting-up) P.
2 kitchen cars, A and H.
1 staff car G.
1 personnel car R.
1 brake and infectious ward (lying) S.
1 brake and store car T
1 pharmacy car F.

Each had a carrying capacity for 306 lying, from 56 to 64 sitting, and 28 to 32 attendants.

In 1917 an officer was appointed Inspecting Officer of Ambulance Trains. This appointment was changed to Inspector of Rolling Stock (Ambulance Trains) in April, and the duties entailed were multifarious. He was responsible for the

condition, upkeep and periodic inspection of all ambulance trains, regular and temporary; for repairs, alterations and final disposal of badly damaged vehicles, and for the supply of light, heat and water to the trains. He saw that trains were properly marshalled, kept a check on their length and weight, and dealt with complaints regarding bad driving and so on. Small workshops and stores at Boulogne, Abbeville and Sotteville for running repairs came under his supervision. The mobilization and inspection of new trains, the supply of vehicles for special evacuation other than by ambulance train and the care of spare vehicles, all formed part of his work. He issued instructions to the Westinghouse Brake Inspector, and as secretary of the Advisory Committee dealt with the correspondence arising with the French authorities and the A.D.M.S. (Amb. Trains) regarding ambulance train technical matters.

Ambulance Trains Nos. 14, 15, 16 and 17 were reorganized in August 1917. Two spare British bogie brake-van coaches (S and T) were attached to these trains in place of the two French *fourgons de service*, making each train up to fourteen British bogie vehicles, and in the other trains British coaches replaced the majority of French coaches, so that during this year the total French vehicles attached to ambulance trains constructed of British rolling stock were one *fourgon* and seven *fourgons de service*. The carrying capacity of trains Nos. 14–17 varied from 156 to 264 lying and 116 to 320 sitting, and 24–32 personnel.

Six additional trains, Nos. 32, 33, 34, 35, 36 and 37, were asked for, and at the meeting of the Ambulance Train Subcommittee in London on May 24th 1917 attention was paid to the following points :—

That in the case of the Great Eastern Railway ward cars, in which the length of coaches available did not allow for more than 30 beds, stretcher brackets should be arranged over the doors to make the capacity up to the standard number, viz., 36. A design for these brackets was supplied.

That the gangway fastening levers be made to spring open when a coupling is broken, so that the gangway is not torn when a train parts.

That sinks be fitted in ward cars instead of basins.

That candle holders be supplied for two coaches only.

That stop-cocks be fitted to all pipes leading from overhead tanks, as near the tank as possible, with a view to preventing pipes bursting during frost.*

* A large number of pipes burst during the severe frost of the winter of 1916–1917, and by means of a stop-cock near the tank, it was hoped that the pipes could be kept empty during frost, although the tank was full. The Midland Railway had fitted rubber piping for this reason so that the fitting of cocks did not apply to their trains.

That improved designs be adopted for the lying infectious sections in car S, and for the store sections of car T.

That an electric light and fan be fitted in the meat safe section of car T, also outside louvres covered with gauze wire for ventilation.

That one seat be removed in the medical officers' compartments in the staff car G.†

That a " side " instead of " overhead " spray be fitted in the staff lavatories.

That an independent switch for corridor lights of staff coach G be provided.

That one at least of the pipes of the Dargue-Griffiths' arrangement for heating the staff and personnel cars should be on the floor level.

That the store room in car A be made into a room for sick officers sitting up, with seats and racks all round and a Sutherland table in the centre for meals.

That a pantry for the staff be arranged in kitchen coach A, in place of old " Pack " store.

That the kitchen range pipes should be made easily accessible to facilitate repairs and cleaning.

That the coal bin in the kitchen should be placed between the range and the side of coach, to prevent blistering the outside paint.

That a small messing-room for senior N.C.O.'s be provided in kitchen car H in place of old " Kit " store.

That " slam locks " should be provided for outside doors on all trains.

At the suggestion of the medical service in France, it was arranged that the personnel car should be exactly the same as a ward car, so that it could be used as such in case of emergency ; incidentally it accommodated 33 personnel instead of 26 (or 32) in the former trains.

These suggestions were carried out by the railway companies who constructed the trains.

These additional trains were all running by the end of December 1917, and each had a carrying capacity of 306 lying, 56 to 64 sitting and 36 to 39 personnel.

While arrangements were being made for these new trains the Advisory Committee was instructed by the Director-General Transportation, whose new organization had lately been formed, to make recommendations for the provision of spare British coaches for ambulance trains. The Advisory Committee recommended the provision of four spare brake and infectious coaches, S type, and two brake and store coaches, T type.

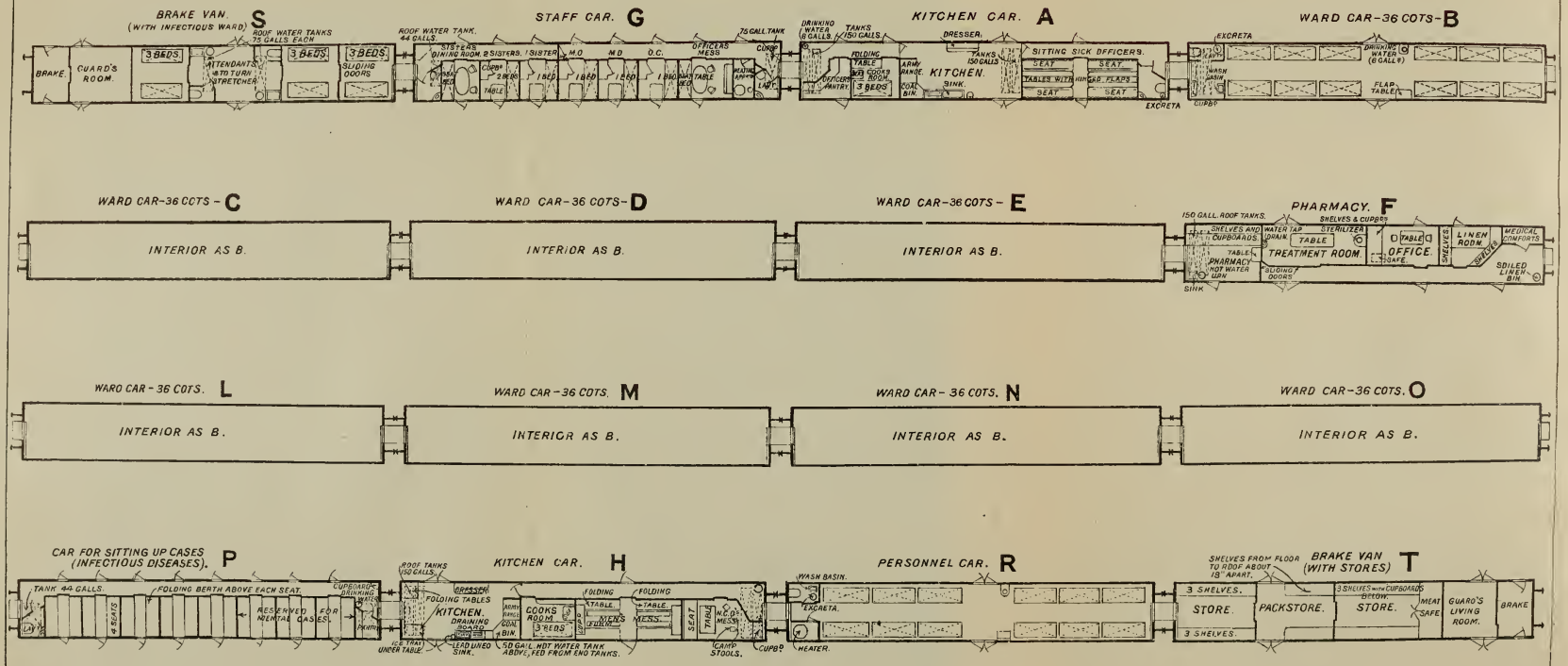
In October 1917 the general organization of a standard train was as follows : Each train was composed of sixteen bogie coaches varying from 58 to 61 ft. in length over buffers, with an average tare weight of 28 tons. They were vestibuled throughout and heated by steam from the engine, with an additional self-contained heating apparatus in the staff and personnel cars. They were fitted with electric light and fans throughout on Stone's system.

---

† At the suggestion of the Ambulance Train Sub-committee, wardrobes were fitted in all the medical officers' and sisters' sleeping compartments in place of the seat.

FIG. 87.

BLOCK PLAN OF A STANDARD AMBULANCE TRAIN IN FRANCE.
OCTOBER 1917.



Malby & Sons, Lith.

The coaches were marshalled in the following order :— S, G, A, B, C, D, E, F, L, M, N, O, P, H, R, T.

Coach S was a " brake van and lying infectious ward," divided into six sections, one (5 ft. long) for the guard, one for the guard's living room (10 ft. long), one for attendants and stretchers, and three for six patients each.

Coach G was the " staff car," divided into nine sections, two sections for nursing sisters' lavatory and dining room and two for their sleeping rooms ; three for the medical officers' sleeping rooms, and one each for their mess and lavatory.

Coach A was a " kitchen and sitting sick officers' car," divided into five sections, one each for the staff officers' pantry, sleeping room for three cooks or officers' servants, kitchen, sitting sick officers and their lavatory.

Coaches B, C, D, E. and *L, M, N, O,* were " ward cars " with thirty-six beds in each, arranged in twelve tiers of three, with a lavatory and washing-up sink at the end.

Coach F was a " pharmacy car " divided into five sections, one each for pharmacy, treatment room and office and two for store rooms.

Coach P was a " sitting infectious car," and was an ordinary corridor coach of seven or eight compartments, devoid of upholstery, with an upper berth above each seat for bad "sitting cases," a lavatory at one end and a pantry at the other.

Coach H was a " kitchen and personnel mess car," divided into four sections, one each for kitchen, sleeping room for three cooks, men's mess and N.C.O.'s mess.

Coach R was a " personnel car," similar to a ward car, except that shelves for packs took the place of one tier of three beds.

Coach T was a " brake van and store car," divided into five sections, two for store, one for store and meat safe, one for guard's living room (10 ft. long) and one (5 ft. long) for the guard.

In 1917 the War Office arranged for the construction of a train, No. 38, for Salonika, and stipulated that no coach was to exceed a tare weight of 15 tons owing to the lifting tackle available at the Salonika ports ; that the train should accommodate about 300 lying-down patients and that the length of the train should not exceed 800 ft.

The following various points were then brought forward and suggestions made in consequence of the experience in running ambulance trains in France up till that time.

All coaches should be intercommunicating.

The intercommunication gangway should be made, if possible, so that when a coupling broke the gangways were not torn or frames bent—either an automatic fastening or the fastening lug made weak was advisable, so that it broke first. Repairing and renewing gangways was a great nuisance, as spare ones were too cumbersome and heavy to carry on the trains.

Central corridors through sitting coaches were in practice a failure.

As the ordinary ventilation provided in lavatories in England was not sufficient, the windows should open at least half way down in addition to any ordinary ventilation.

Steam heating pipes in the roof were unsatisfactory, and efforts should be made to fit at least one pipe on the floor level as oil stoves had to be used in France for the floor level when both pipes were situated in the roof.

Steam heating couplings should be of the type used in the country, or plenty of spare couplings made available.

As the electric light was not likely to fail in more than one or two coaches at a time, it was an economy if candle holder brackets only were fitted in coaches, and a couple of dozen candle holders carried on the train, to be put in the brackets when required.

The coaches that put a train out of action from a medical point of view were the kitchens and pharmacy, and from a railway point of view the brake vans.

Even one kitchen range out of order seriously affected the efficiency of a train, and a number of "range spares" were necessary, especially boilers. Iron hot water pipes from the boiler to the over-head tank became choked by scale and required cleaning every four to six months, which was difficult with the system of piping then in use. Lead pipes did not scale. The steam escape from the overhead hot water tank was a source of trouble and should be carried away *under* the coach—the pipe should not be continuous, as it syphons. The collection of condensed water—which was tried—was not much used in France. The kitchen coal bunkers should be between the side of the coach and the range, as the heat of the range blistered the paint on the outside of the coach, if near the side.

The provision of spare brake van coaches, S. and T., was advisable as they were the ones which were most essential and being at the end of the train got most damaged in collisions.

Guard brake van doors should open inwards.

The G.W. Railway pattern of outside door locks was not good. That of the G.E. Railway was probably the best.

The treatment room in the pharmacy coach was practically never used for operations, but in practice was sometimes used as a mortuary, though it was not expedient to call it by that name; consequently it was advisable to arrange it so that a stretcher could be carried in, but lead lining and elaborate fittings seemed unnecessary. It was also used by sisters for preparing dressings and was useful as an officers' or sisters' bathroom, when a train was not loaded.

Shower baths in lavatories for officers were not altogether a success; and if possible, a small bath-room for medical officers and sisters would be a benefit.

Basins were unnecessary in the cook's room in kitchen coaches.

All accommodation should be for lying cases, except one coach. The lying accommodation was easily convertible into sitting, but not *vice versa*.

Accommodation for sitting sick officers was found necessary, so that they could have their meals apart from the other ranks.

It was advisable to cater for at least three different kinds of infectious cases.

Bars should be fitted over the door drop lights of three compartments in coach P. for mental cases.

Ash trays to each cot were of great use.

One bed seat was all that was necessary in medical officers' compartments, and a shelf placed under the net rack on the other side for books.

The personnel coach R. should be the same as a ward lying coach, so as to be convertible into a ward in times of extreme pressure.

Excreta bins were never used as such.

The portion of the stores coach in which to hang meat should be partitioned off by a frame with gauze wire panels and large doors so as to keep the flies off. This was fitted to the trains in use in France.

The coach letters should be painted inside the doors of the patient-carrying coaches, so that they could be plainly seen when doors were opened for loading. Commanding officers had letters painted on boards, and hung inside the doors when loading; this considerably facilitated loading.

After the train for Macedonia had been constructed, it was found that it was not required there and it was consequently sent for use in France. This necessitated the alteration of the brake gear from vacuum to Westinghouse. It had a carrying capacity for 302 lying, 33 sitting and 34 personnel.

In June 1917, with a view to saving shipping, it was proposed to run a service of ambulance trains on the Mediterranean lines of communication between Taranto and Cherbourg. A meeting was held in London on July 13th at which were present Sir Francis Dent and other members of the Sub-committee, Colonel Statham representing the Mediterranean lines of communication, representatives from the War Office, and the Inspector of Rolling Stock (Ambulance Trains) from France. The suggested arrangements for the trains differed from the latest trains in France in the following manner:—

An ordinary ward coach P with thirty-six beds was provided instead of the infectious sitting coach P.

The operating or treatment room in the pharmacy coach F was dispensed with, as it was considered that the few emergency operations necessary in practice could be carried out in the pharmacy section, and it thus became possible to provide a small ward to accommodate specially bad cases near the pharmacy. This ward contained eight beds in tiers of two (instead of three) so that special patients could have more air space and be more conveniently attended.

The guard's living compartment in coaches S and T was dispensed with, thus enabling the store accommodation in coach T to be increased, and a fourth infectious compartment to be added to coach S which increased the number of different classes of infectious cases that could be carried, from three to four, with an addition to the train of six beds.

This necessitated redesigning coaches F, S and T, and the ultimate result was that sleeping accommodation was provided for 356 patients, as compared with 306 on the latest trains then in France, thus:—

9 ward coaches of 36 beds	324
F coach, 1 compartment of 8 beds	8
S coach, 4 compartments of 6 beds	24
Total	356

The reason for increasing the sleeping accommodation was, that the long run between Taranto and Cherbourg involving a long journey, necessitated sleeping accommodation being provided for everyone on the train and as the cost of running a train this distance was high, it was obviously desirable to carry in each train the maximum number of patients who could be carried with reasonable comfort.

A large cupboard for linen and a cold storage section was provided in coach T; the latter being considered preferable to small ice boxes in each coach.

Bathrooms were provided in coaches A and F in preference to sprays in each lavatory.

Latrine buckets were rendered "fly-proof" as far as possible, by surrounding them with a wooden casing fitted with a lid, and the casing was ventilated by means of a hole in the floor and a pipe at the top leading through the roof of the coach, so that a current of air passed through the box or casing, when the lid was closed. These air vents were covered with gauze wire. The lids were made to close automatically by the builders, although it was originally pointed out that in practice this was known to be unsatisfactory. As was anticipated, the lids had to be altered afterwards.

Each window was fitted with an additional wooden shutter or louvre, covered with gauze wire as a protection against the mosquitoes. It was found possible to fit one additional frame without altering the standard pillars of the British railway companies, but it was not possible to fit a separate frame for both louvre and gauze wire. In addition, thick ordinary blinds were fitted to prevent light from showing outside and disclosing the position of the train in advanced areas.

Double roofs, with an enclosed air space, were fitted on all coaches.

These trains were numbered 39, 40, 41 and 42. Nos. 39, 41 and 42 were eventually used for work with the Italian Expeditionary Force and also in France. No. 40 was sent direct to Egypt for work in Palestine, where it was replaced later by No. 43 and transferred to France. The carrying capacity of these trains was 356 lying and 39 personnel.

Four special ambulance or pharmacy vans were built, for attachment to troop trains running on the Mediterranean lines of communication, and were for use in case any men on these trains were sick or injured during the long run. A four-wheeled vehicle was decided upon; it was divided into three sections, one as a pharmacy, one for attendants' lavatories and stretchers, and one as a small ward to carry four lying down, or six sitting and two lying down cases. Towards the end of the year twelve more of these vans were sent direct to Italy.

In 1918, owing to the difficulty in obtaining coaches on the French railways for repatriating prisoners of war or for transporting small parties of sick and wounded, purposes which did not warrant the use of a complete ambulance train, it was decided to ask for six additional ambulance coaches from England. At this time each British ambulance train consisted of sixteen bogie vehicles, with the exception of Nos. 12, 14, 15, 16 and 17, and to bring these trains up to the 16-bogie standard, certain special coaches were ordered and the reorganization was carried out.

Up to April 1916 all British trains in France were examined and repaired every three months at Boulogne, while the vehicles of the French trains were sent to the railway workshop of their company also every three months. Later the British trains

were sent to Audruicq at least every six months for examination and repairs ; but experience showed that they required examination and repair every three months ; otherwise they gave trouble.

With regard to minor alterations and repairs, a small staff consisting of four men, including one serjeant, two carpenters and one smith, were lent to the railways from April 1915. In April 1916 a mechanic to assist in looking after the interior of ambulance trains was sent out by the Ambulance Train Subcommittee. In March 1917 six more mechanics were sent out by the War Office and in April of the same year a Westinghouse brake inspector was sent out. With this small British staff all the repairs to the interior of British ambulance trains were gradually taken over from the French.

Minor or running repairs were carried out by the French and British at the bases Boulogne, Abbeville and Sotteville, to which trains usually evacuated and were garaged.

A large number of the ambulance trains was damaged by enemy aircraft. The attack by aeroplanes on them raised the question of the use of the Red Cross on trains and the best position for garaging them. It was pointed out that the red crosses became obliterated by dirt and smoke in a short time and that they were therefore no use as a protection against aircraft, and, further, when the red crosses were freshly painted, they gave airmen at low altitudes a good guide to the track on which a train was moving, and if the train was standing in a siding provided a good target for the enemy to drop bombs on the other railway stock alongside.

The provision of ambulance trains for Mesopotamia was taken up by the Army Commander of that force on 7th August 1916. It was decided to ask for five ambulance trains. They were supplied from India. The trains first ordered were named No. 1 Ambulance Train, No. 2 Ambulance Train and No. 3 (Aden) Ambulance Train. Ambulance Trains Nos. 1 and 2 consisted of fourteen coaches and included seven ward coaches, each accommodating twenty lying cases. These were intended for British and Indian sick and differed only in their latrine accommodation. No. 3 (Aden) Train consisting of nine coaches had been designed for use in Aden.

The Director of Railways in India pointed out that the fourteen coaches were too heavy for the engines. It was therefore decided that Nos. 1 and 2 Trains should be made into four trains—Nos. 1A and 1B and Nos. 2A and 2B. Nos. 1A and 2A had accommodation for 80 lying or 160 sitting, Nos. 1B

and 2B for 60 lying or 150 sitting, and No. 3 (Aden) Train for 100 lying or 200 sitting. Two of these trains were to be used solely for British and two solely for Indians, while No. 3 (Aden) was to be used for either British or Indians.

This scheme of organization completed the five trains asked for, provided two sets of additional coaches, each set consisting of one coach for personnel, dispensary and office and another for guards, stores, ice-box and soda water, were supplied.

On 6th January 1917 the first consignment of ambulance train coaches arrived at Basra, and on subsequent dates the remaining coaches arrived, and the trains were completed and taken into commission. Each train was fitted with electric light, electric fans, air extractors and fire extinguishers. The establishment of personnel for an ambulance train was fixed on 11th January 1917 as :—One officer commanding (R.A.M.C. or I.M.S.), one assistant surgeon or sub-assistant surgeon, two nursing sisters, one serjeant (for steward and dispensary duties), one corporal (for pack store and office), two privates R.A.M.C. (for general duties), and four privates R.A.M.C. (for ward duties).

The Indian personnel attached was :—two ward servants, four sweepers, one cook (Hindu), one cook (Mohammedan), two cooks (Army Hospital Corps), and one water carrier.

TEMPORARY AMBULANCE TRAINS.

Before temporary ambulance trains were organized as definite units, empty supply trains and trains consisting of passenger coaches were used for carrying sick and wounded in emergencies, whenever the regular ambulance trains were inadequate to relieve congestion in army areas.

The only definite organization for equipping and preparing empty supply trains for temporary use as ambulance transport was that carried out by Surg.-General W. G. Macpherson, when D.M.S. of the First Army, after the battle of Neuve-Chapelle, but his scheme had only to be used on one occasion.*

The use of passenger coaches for the assembling of a temporary ambulance train in emergencies was commenced during the battle of Neuve-Chapelle, and, owing to the experience then obtained, definite regulations were drawn up for their use on subsequent occasions.

They were given distinctive letterings. Those used on the the northern system were marked N.A., N.B., N.C. ; those on the southern system S.A., S.B., S.C. and so on.

---

* *See* Vol. II, General History Medical Services and Appendix B.

If empty supply trains had to be used they were to be described by the name of the railway transport officer and of the railhead at which it was loaded, for example :—" Smith's Merville Ambulance Train."

Many faults were noted in the running of these trains during 1915, the commonest of which was that too many so-called lightly wounded cases were still being put on these trains.

Other difficulties noted were those connected with the preparation of the ordinary ration for the patients. Biscuits were issued instead of bread, and articles such as bacon could not be cooked. When the trains were stationary, patients would not remain in their carriages and discipline was difficult. Methods of carrying supplies of drinking water were unsuitable. In some trains water was carried in pails and camp kettles, but it was splashed out owing to the motion of the train, and finally, on arriving at the base, the train personnel had difficulty in salving their equipment or in getting back quickly to their units at the front.

The standing orders for medical officers on duty with improvised ambulance trains were consequently drawn up :—

1. Make sure by personal inspection that only cases fit for a long railway journey sitting up are placed on the train.
2. See that sufficient rations for patients and personnel for one day are put on the train in advance.
3. See that the blankets and equipment provided are distributed so as to supply all the coaches occupied by sick and wounded.
4. Post the R.A.M.C. personnel in such a way that one orderly is responsible for each group of coaches. The six orderlies will be instructed to make the senior N.C.O. or soldier in each coach responsible to him for the behaviour of the patients and for bringing requirements to his notice.
5. If traffic arrangements permit, trains will be stopped at intervals to enable men to descend for purposes of nature. See that no straggling occurs, that the patients are visited during the interval, that rations are distributed if required, and that the station is not rendered insanitary.
6. All trains will proceed to the south *via* Abbeville, where a meal will usually be available. Water of good quality is available at most of the stations along the line, and systematic arrangements should be made in advance to convey it to the sick and wounded.
7. When passing through Abbeville on the journey to southern bases, report to the detraining medical officer there, and state how many trucks you will require for your equipment on the return journey.
8. If patients become unfit to continue the journey sitting up, make all arrangements to hand them over to the medical authorities at the next place of halting at which a hospital exists.
9. On reaching destination hand over cases to the medical personnel sent for this purpose, and apply to the R.T.O. for facilities to return to the area in which your unit is stationed. You should lose no time in starting back with your personnel, equipment and blankets to rejoin your unit, where your services may be urgently required.

Instructions were also sent to the D.M.S., L. of C., asking him to ensure that parties sent to the base in charge of

improvised trains were assisted in every way by medical units on the lines of communication, and returned to the front without delay.

These improvised trains, provided the necessary care was taken to select the class of case for conveyance on them, served a useful purpose and were satistactory, as the great majority of patients were comfortable, and large numbers could be evacuated by them.

In June 1916 a new organization of improvised trains was introduced. They were to be designated temporary ambulance trains (T.A.T.), given distinctive numbers commencing with 100, be composed of a definite number of vehicles, and have a special equipment and establishment. They were to be assembled only in anticipation of an emergency from passenger rolling stock and broken up immediately the emergency ceased to exist.

A temporary ambulance train then consisted of twenty-one 3rd-class vehicles for patients and a 1st-class or 2nd-class vehicle for the medical staff. Each 3rd-class vehicle consisted of six compartments, and each compartment had accommodation for eight sitting cases. The whole train could thus carry 1,008 patients. In several of the trains a small *fourgon* was attached and fitted out as a kitchen.

The personnel consisted of one medical officer, one N.C.O. and eight privates of the R.A.M.C. They were obtained from the regular ambulance train service, which had to organize the personnel and instruct them in their duties on a temporary ambulance train. The medical officer became O.C. of the train, the N.C.O. acted as serjeant-major, and the senior orderly as steward. The train was divided into six sections, and a R.A.M.C. orderly was placed in charge of each section. The same regulations as applied to improvised trains were in force.

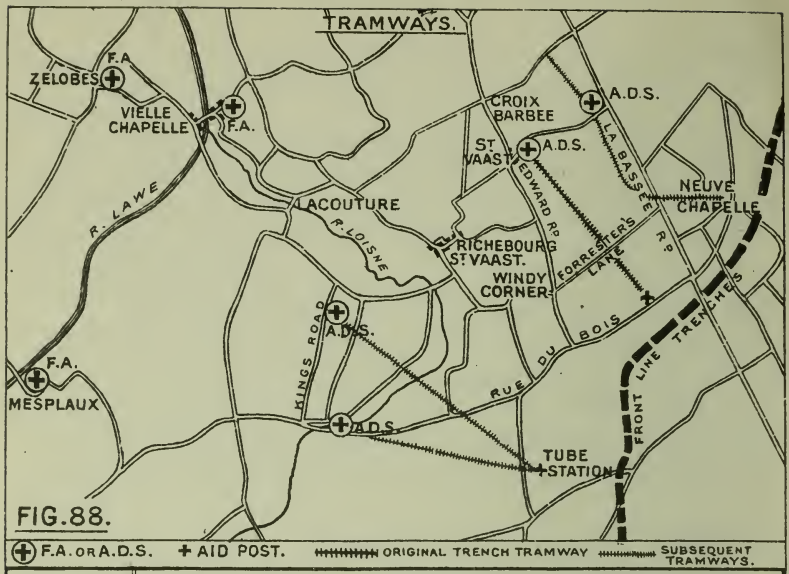
The rations for the patients were put up in ration boxes, and one box was placed in each compartment as the patients entrained. Each box contained sufficient bread, biscuits, jam and cheese for eight persons. Hot drinks and suitable food were provided by the authorities at certain rest stations.

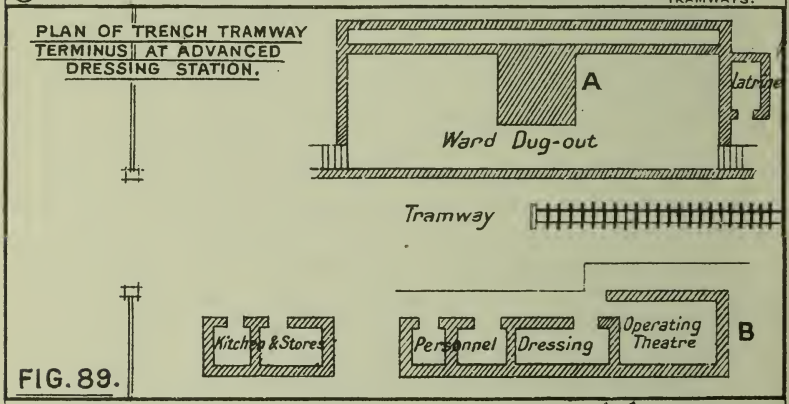
The following additional equipment was carried :—

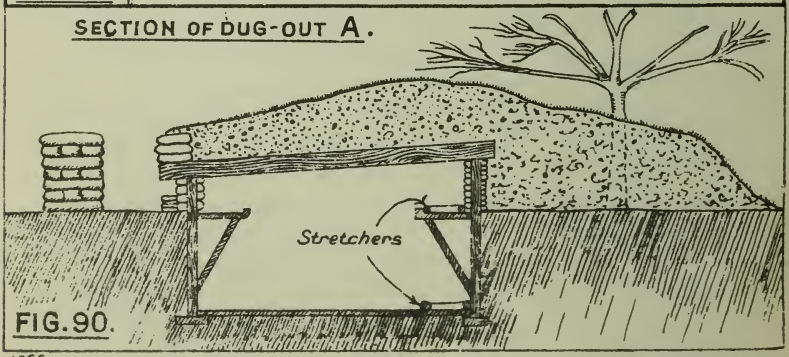
Supplies and Medical Comforts.

Milk (cases), 6 (enough to make 1,000 pts.).
Cigarettes (case), 30 lb. (one packet to four men).
Matches (gross), 1.
Lime Juice (gals.), 2.
Sugar (2 sacks), 160 lb.
Tea (1 case), 15 lb.

To face page 647.







1926.

Malby & Sons, Lith.

Cocoa (1 case), 40 lb.
Pea Soup, 10 lb.
Beef Extract, 10 lb.
Biscuits (12 tins), 600 lb. (as a reserve stock).
Preserved Meat, 600 lb.
Cheese, Jam, Bread and Biscuits } For 1,000 patients.
Brandy (bottles), 2.

Medical and Surgical Equipment.

Reserve Dressing Box, 1.
Medical Companion, 1.

Ordnance Equipment.

Cans, soup (3 gals.), 20 (each holds enough for one coach).
Bowls (sm. lading, W. Hdle.), 2 (for serving hot drinks).
Stools, nests of six, 2 (one per coach).
Lamps, hurricane, 6.
Pannikins, enamel, 100 (five per coach, one per compartment).
Oil, paraffin (gals.), 6.
Feeders, enamel, 20 (for face and jaw cases).
Urinals, 20 (for cases unable to walk to lavatory).
Bed-pans, 2 (one each end of train).
Brushes, hand, scrubbing, 4.
Brushes, sweeping, 4.
Stoves, Soyer's, 2.
Soap, bars, 10.
Soap, scouring, bars, 10.
Brushes, sweeping, hand, 4.

A record of each journey was prepared and forwarded to the A.D.M.S. Ambulance Trains at Abbeville or his D.A.D.M.S. at Boulogne. The report gave full particulars as to place and time of starting, numbers carried, patients transferred *en route*, halts made—their times and duration—destination and hour of detraining at bases. A telegram was sent to the D.M.S., lines of communication, and to the A.D.M.S. of the base to which the train was to proceed, giving the number of the train, the numbers carried, the army from which it was loaded, and the destination of the train.

THE USE OF LIGHT RAILWAYS FOR AMBULANCE TRANSPORT.

The trench tramways running between regimental aid posts and advanced dressing stations, and the system of Decauville field railways constructed behind the front line were both used for the conveyance of sick and wounded by special arrangements. The French narrow gauge railways were also used in many places for conveyance of casualties from main dressing stations to casualty clearing stations.

The first trench tramway was constructed in France in May 1915, and was used by the Meerut Division during the battle

of Festubert. It was very roughly constructed of wooden rails and wooden trolleys. The trolleys were used for taking down water and supplies to the regiments holding the lines in front of the Rue du Bois. On the return journey three lying cases were placed on each trolley, and these were pushed by field ambulance stretcher bearers from the collecting post at the Rue du Bois to the advanced dressing station at Richebourg St. Vaast, a distance of 1,500 yds. (Figs. 88, 89 and 90.) The patients were unloaded at St. Vaast and accommodated in dug-outs. Occasionally a shell burst on the railway line and destroyed it, but the breach was rapidly repaired. There is no record of the numbers of patients evacuated by this method during the battle.

TROLLEY FOR TRENCH TRAMWAYS
FRANCE.

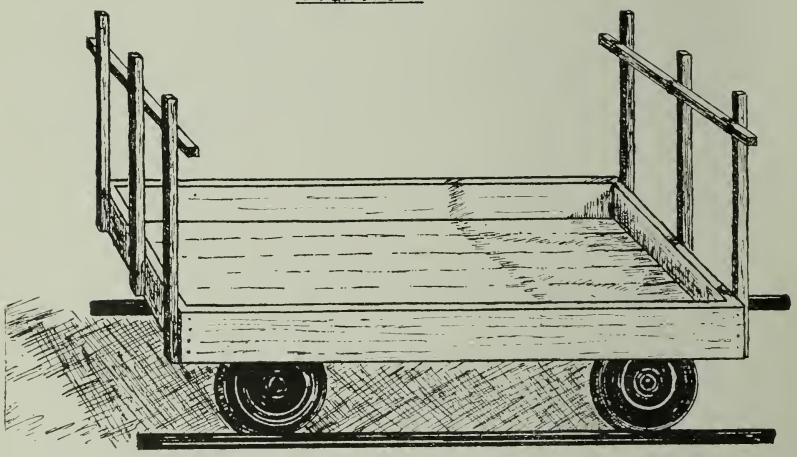


Fig. 91.

By the end of the year the system had developed, and in the Meerut divisional area alone there were four such tramways. At the battle of Loos in September 1915 a similar system was used with success. One division operating near the coal mines employed the iron rails and trolleys which were found in their area. The small iron trolleys were refitted with a wooden platform and rails ; three lying cases were carried on the former and two across the latter. (Fig. 91.)

It was calculated that it took thirty minutes to clear the wounded by hand from the front line trenches to the collecting post, thirty minutes by trolley from the collecting posts to the advanced dressing stations, and that the majority of casualties

were admitted to the casualty clearing stations in one and a half hours from the time of being wounded. Other divisions operating in the same battle devised rough and ready tramway lines and trolleys which were of very great value in evacuating the wounded.

During the subsequent years of the war in France the system of evacuating casualties from regimental aid posts by tramways was greatly extended, and as far as possible all regimental aid posts were situated close to a trolley line. This was a noticeable feature in the medical arrangements for the battle of Messines and the Third Battle of Ypres. Some of the trolleys were placed over land and others were placed in trenches. In the latter some were worked on an overhead line, while those running along the bottom of the trench or across the open were pulled either by men or by mules.

In time a divisional trench tramways officer was appointed and he was accommodated in or near the advanced dressing station and co-operated with the officer in charge of the station. He was responsible for trolleys with gate ends being available for stretcher cases, for the supply of mules for drawing the trolleys to the regimental aid post and for the repair of breaches in the tramway line. If the troops advanced and objectives were taken, tramway lines were laid up to the new positions as soon as possible. These extensions were planned by the C.R.E. of the division and by considering the requirements of the medical service the wounded were evacuated speedily and smoothly.

There was no standard pattern of trolley made for these tramway lines ; one type is illustrated, but it must be remembered that the trolleys were also used for the transport of supplies, and it was not always possible to design trolleys which would be suitable for the evacuation of four stretcher cases. The general idea seems to have been for formations to make a uniform pattern truck with a flat platform, and allow divisions to add the superstructure each required. This allowed them to take into consideration the formation of the tramway lines in their trenches, as on some trench tramways the curves were sharper than others, and precluded any standard superstructure being issued.

The Decauville railways were used principally for the taking up of supplies and ammunition. The wounded were evacuated by small special ambulance trains, by improvised ambulance trains and by empty supply and ammunition trains. The special trains were used for the more serious and the others for the less serious cases.

A special ambulance train usually consisted of an engine, two covered hospital trucks each with accommodation for twelve lying cases, and a D-class truck which could accommodate twenty-four sitting cases (Fig. 92). Each train, therefore, could carry forty-four patients. Usually one train was allotted to a division in the line. Extra wagons could be added if they were available, but it had always to be remembered that the traction power of the engine was limited. The wagons were fitted with stretchers, blankets, stoves (one per hospital wagon), and hot water bottles, and the trains were staffed by R.A.M.C. personnel detailed by the A.D.M.S. of the division to which the train was allotted.

HOSPITAL TRUCK, DECAUVILLE RAILWAY, FRANCE.

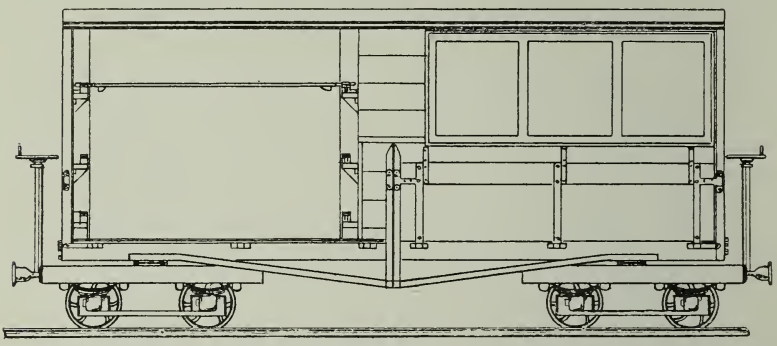


Fig. 92.

The improvised hospital trains for evacuating the slightly wounded cases were used on the French narrow gauge railways, and as a rule consisted of an engine and six trucks, the latter being covered with tarpaulins. Sometimes these trucks were fitted up with a frame apparatus for carrying stretchers. Thus, on the Frévent–Avesnes line, each train consisted of eight trucks or six carriages. Each carriage could seat 18 sitting-up cases, making a total of 108 in the train. A covered truck could carry six stretcher cases on the floor and still allow a gangway across the centre. It was possible to load and unload these stretcher cases without any difficulty. The time occupied on the journey between Avesnes and Frévent was about an hour. A train party of one N.C.O. and two men was provided from the stationary hospital at Frévent, and also an equipment for each train of one medical companion and water-bottle, one surgical haversack and water-bottle, six shell dressings, three urinals and three bed-pans.

There were many other instances of the use of the French narrow gauge railways in this manner, notably that of the line from Acheux to Gézaincourt during the Somme battles of 1916 and subsequent battles in that area.

During the operations in Mesopotamia against Kut-al-Amara in December 1916 and the early months of 1917, a light railway, 2 ft. 6 in. gauge, was used for the evacuation of 17,122 casualties. The railway line was laid from the Sinn position to Shaikh-Saad, and at a later date it was extended to Imam-al-Mansur, which became the railhead. (Fig. 93.) About eighty trucks were at first available for carrying sick and wounded on this line, but the number was subsequently increased. The trains were usually composed of nineteen or twenty-one trucks,

TRUCK, DECAUVILLE RAILWAY, MESOPOTAMIA.
USED FOR EVACUATING CASES FROM
SINN POSITION TO SHEIKH SAAD.

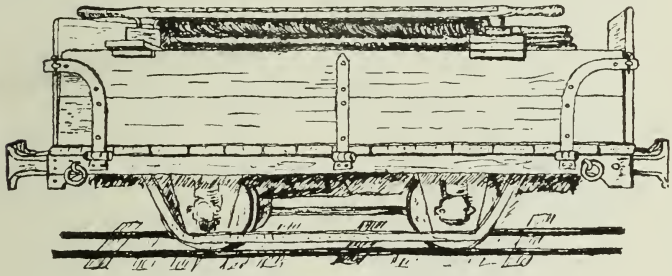


Fig. 93.

of which two were required for water tanks and traffic purposes. The majority of the trucks had side flaps and many of these had high wooden end-screens fitted so that the truck might be stacked with wood, fuel or other supplies on the outward journey. Over these end-screens a tarpaulin could be fixed, and so arranged that passengers would be shielded from rain and wind, while the opposite side could remain partially open. Four stretchers, two on the floor and two across the top of the truck, were carried. By using special blocks and planks the stretchers were securely fixed for lying cases, and when the trucks were not required for stretcher cases the planks were utilized as forms. There was space for four of these forms, each seating four patients, so that sixteen patients could be accommodated in each truck, if necessary.

It was arranged that there should be two trains per day to clear the casualty clearing station at Imam and to entrain cases collected at the railhead at Sinn. Later four, and very occasionally six trains had to be run. The journey usually occupied six hours, but there were frequent delays owing to the state of the track. A medical officer and personnel accompanied each train, and at Sinn and Twin Canals, and later at Imam, hot drinks and sandwiches were served to patients.

After the occupation of Baghdad, a light railway was constructed to Ruz on which hospital motor trolleys, as illustrated in Fig. 94, were used for the evacuation of cases from the force operating near the Persian frontier.

HOSPITAL MOTOR CAR USED ON LIGHT RAILWAY RUZ-BAGHDAD, MESOPOTAMIA.

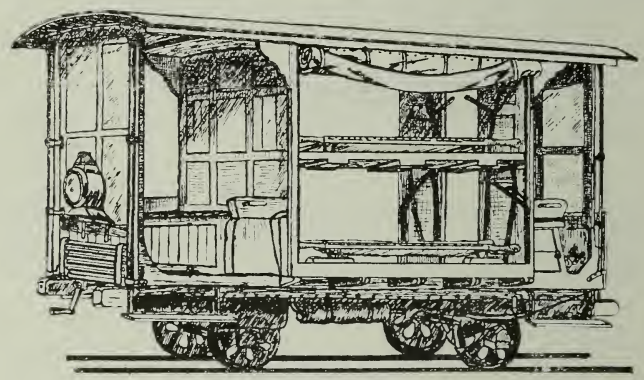


Fig. 94.

AMBULANCE TRANSPORT ON INLAND WATERS.

The use of local craft.

The native boats on Lake Doiran were used for conveying lying-down patients across the lake from Doiran village to the railway station, during the withdrawal from Serbia in December 1915. The boats were built of broad planks coated with pitch. They were flat-bottomed, sharp at both ends, and were about 18 ft. long by 3 ft. wide at the middle, and the sides came together somewhat, narrowing to about 2 ft. across the gunwhales at the widest part. One man rowed from the front of the boat with a pair of oars and a wooden outrigger. Each boat just held one stretcher and an attendant in addition to

the native boatman. The shores of the lake shelved very gently and were pebbly, and the bows of the boat could thus be drawn up on the shore and the patient carried on the stretcher and placed in the bottom of the boat with great ease. The journey

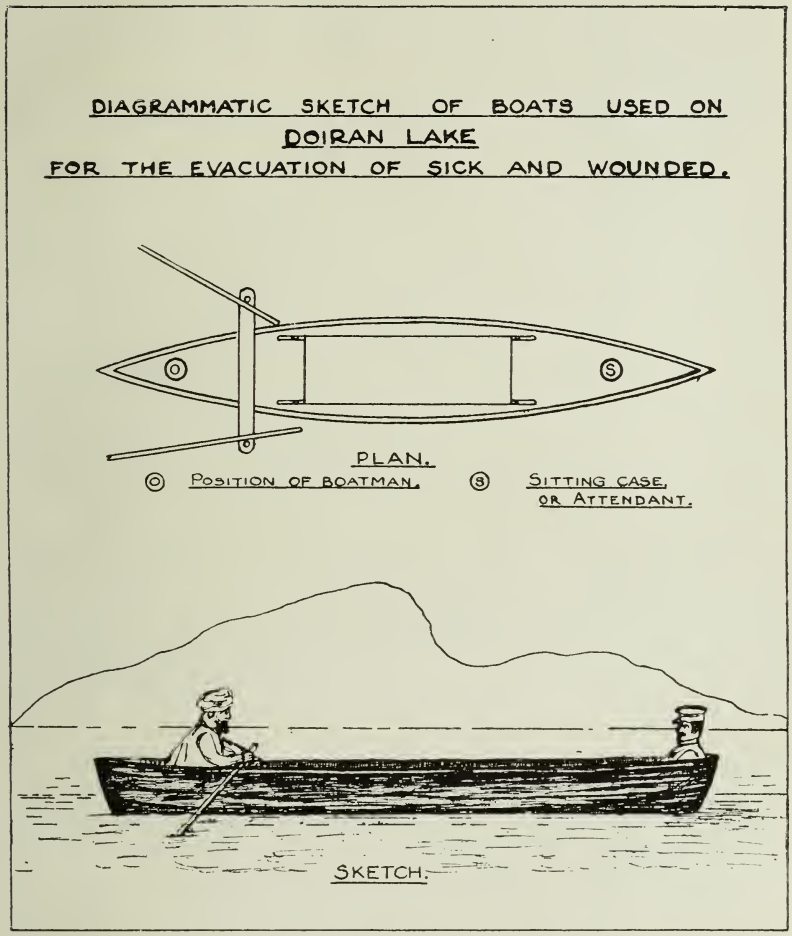


Fig. 95.

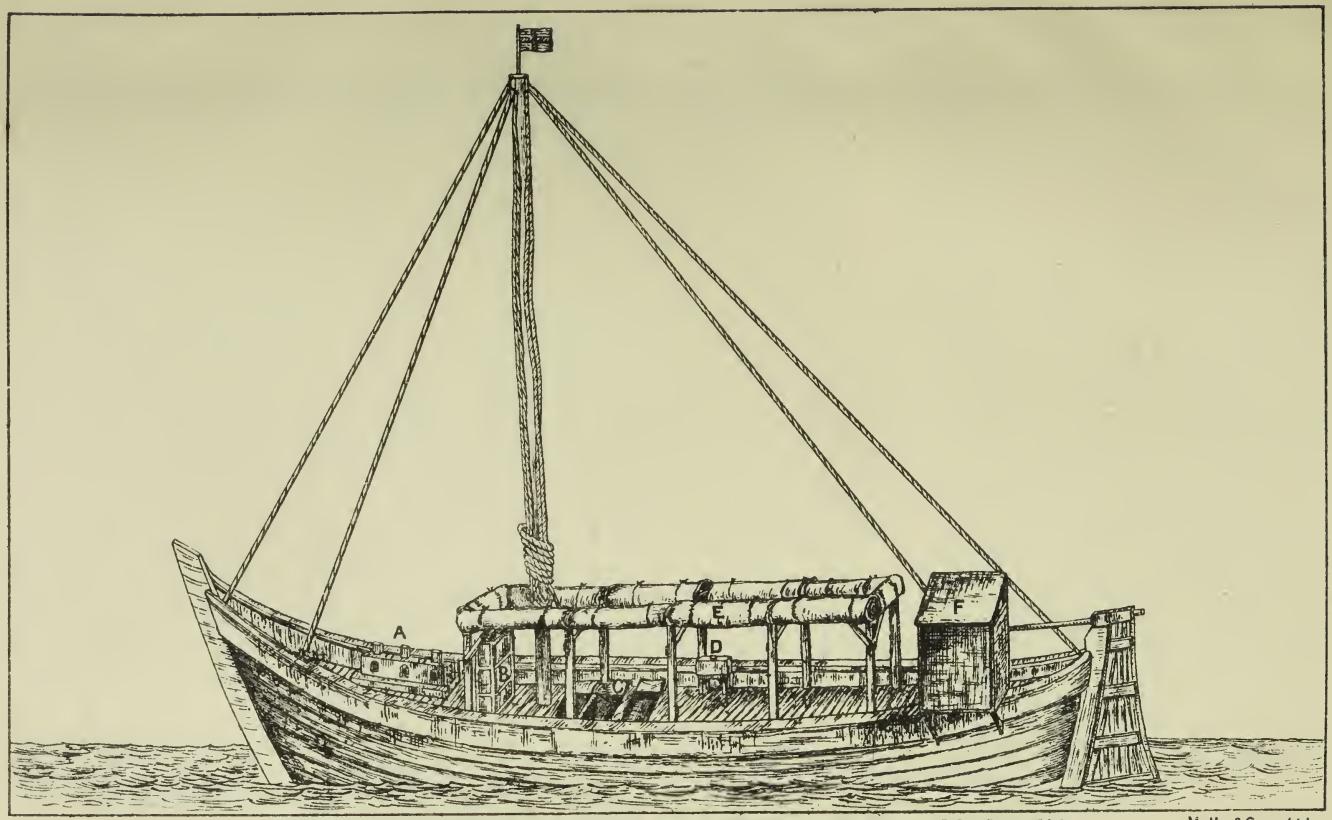
across the lake took nearly an hour, and stretcher bearers met the boats and carried the patients to the railway station. This method of bringing lying down cases was exceedingly comfortable, and saved a journey of nearly three miles over a bad road. (Fig. 95.)

In Mesopotamia considerable use was made of the local river craft for sick transport in the earlier phases of the campaign. The mahela, the large sailing craft of the Tigris, the bellum of the Euphrates, a sailing craft of some 60 ft. in length by about 12 ft. in width, and the small craft of from 15–20 ft. long of the Shatt-al-Arab, also known by the term "bellum" and propelled by poling in the shallows or by paddling, were all utilized as occasion arose.

During January and February 1916 ordinary unfitted Euphrates bellums were used for the evacuation of casualties from Nasiriya to Basra. These bellums frequently did not arrive in Basra until nine days had elapsed from the day of sailing from Nasiriya, and much suffering was caused from the difficulties experienced in affording suitable attendance and nursing during the voyage. Consequently, during the early part of the following summer, when the Euphrates was in high flood, paddle steamers and stern wheelers were able to cross the Hamar Lake, and sick were brought down by them to Basra or were landed at Qurna. At the end of July, however, it was no longer possible to get steamers through the lake, and arrangements had necessarily to be made to transport the sick and wounded by mahela. Nine of these were fitted out, with a flat chetai roof supported on a scantling frame-work and a chetai covered latrine overhanging the starboard quarter. Two 15-gallon pakhals and a Persian filter were provided for water in each vessel. (Fig. 96.)

These craft travelled in convoy, one of them being used for administrative purposes. It carried a medical officer and the rations and stores. The convoy halted at 10.30 a.m. daily to enable the staff to prepare a meal for the patients and tied up again at 5 p.m. for the night and a second meal. The distance across the lake was only about thirty miles, yet the time taken for the journey varied from two to three days according to the wind. Control of the convoy by the medical officer was difficult, as the Arabs poling the mahelas were sometimes very unruly, and the sick and wounded suffered much discomfort.

In the battle of Ramadi on 29th September 1917, bellums were used in actually evacuating battle casualties direct from the field. The operations were carried out at a distance of some twenty-five miles from a casualty clearing station, and as available road transport was limited and the roads were very bad, it was decided to collect all cases at a post on the river seven miles downstream from the advanced dressing



IMPROVISED HOSPITAL MAHELA, EUPHRATES FRONT MESOPOTAMIA.

Malby & Sons, Lith

A. COOKING RANGE. B. FOOD SAFE. C. STRETCHERS. D. WATER TANK. E. CHETAI ROOF AND FOLDING SIDE SUNSHADES. F. LATRINE.

FIG. 96.

1326

station. From there the slight cases were evacuated to the clearing station by empty supply wagons, moderate cases by motor ambulance convoy and the serious cases, such as head, chest and abdominal wounds, by river. The conversion of bellums into hospital boats had to be done quickly so as not to interfere with the getting up of supplies. In these circumstances it was not possible to make permanent fittings, but each bellum was scrubbed with a disinfectant, and straw, covered by a tarpaulin, was laid at the bottom; on this the stretcher cases were loaded, and with a small personnel and such stores as were necessary the bellums were dispatched when loaded to the casualty clearing station. Although the temperature was over 100° F., only one patient complained of any discomfort on this account.

Motor Launches.

Motor launches were used for many duties connected with the medical services in ports both at home and overseas. They played a very important part in the Mesopotamian campaign, for wherever the troops went, the main positions were situated near the river and the majority of medical units were stationed on the river banks or, as in the case of Basra, on creeks leading out from the main river. Roads were few and both difficult and costly to make, and in the very wet weather became impassable, so that it was necessary to have this form of water transport.

In April 1916 the units operating on the Tigris had only one petrol-driven private launch, the "Aerial," so named from its aerial propeller, for the evacuation of serious cases. The Turks recognised this as a hospital launch and refrained from shelling it. It proved so useful that the employment of motor launches in considerable numbers for the evacuation of sick and wounded was decided upon. After consultation with such expert advice as was locally obtainable it was decided that the type of launch should be 40 ft. long by 9 ft. in the beam, maximum draught loaded 2 ft. and speed ten knots in still water. It was recommended that the engine be installed as far forward as possible to allow a clear space for stretchers, and that the wheel and tiller steering should be controlled by one man. Each launch should be able to accommodate thirty to forty sitting or ten to twelve stretcher cases, and should have thick double canvas awnings and strong towing posts fore and aft.*

* Illustration of launch on p. 338. Many of these launches were gifts and often were supplied by the Red Cross Societies.

The Director of Medical Services estimated his requirements at sixty-five launches, and these eventually arrived at Basra and were used very extensively, not only in the forward areas, but at all the posts on the Tigris and Euphrates.

Many of the difficulties associated with their use in Mesopotamia were due to inexperience. The engine was frequently driven at its full speed, regardless of the strength of the current, the roughness of the water or the economic power of the engine. In addition a frequent source of difficulty was the clogging of the water circulatory system with mud carried down by the rivers, especially during the flood season.

The British Red Cross Society had an excellent motor launch repair depôt at Basra and its staff of highly skilled mechanics and motor launch drivers gave the greatest assistance in connexion with the use of the launches by the medical services on the river.

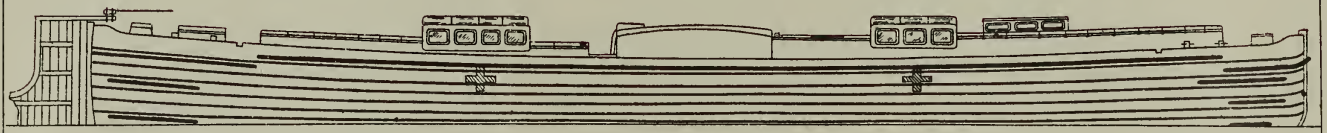
Ambulance Barges.

Early in 1915 the D.M.S., First Army, Surg.-General Macpherson, suggested that three canal barges should be fitted up and used for the segregation and treatment of infectious cases and at the same time he sent an officer to Estaires to appreciate the possibility of using commercial barges on the waterways and canals in that neighbourhood for the evacuation of wounded. As a result of his appreciation, the Director-General of the Medical Services in France suggested that three barges might be prepared for the evacuation of wounded. The Quartermaster-General gave his approval of this scheme on 19th March 1915.

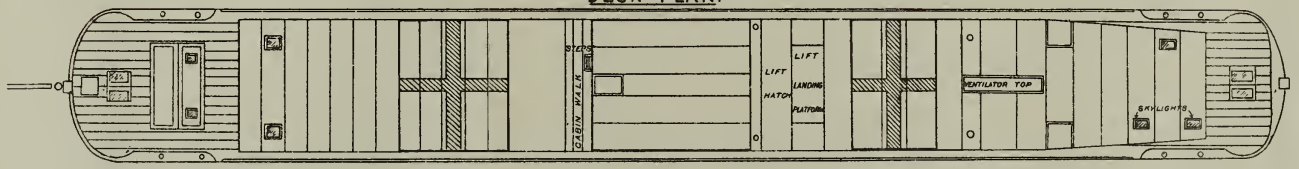
The first vessel was commissioned for service on 18th April and other five were put into commission at a later date. These formed No. 2 Ambulance Barge Flotilla. But, early in the war, four barges were fitted out by an organization known as the British Water Ambulance Fund for work on the Seine. Each barge was designed to carry fifty patients. This flotilla conveyed patients from Paris to Rouen and at a later date from Rouen to Havre. It was commanded by Captain Douglas Hall, M.P., and was eventually absorbed into the army organization and became No. 1 Ambulance Flotilla. The unit was disbanded in November 1915. It had carried in all 5,230 patients.

Six more barges were authorized for the northern canals on 2nd June 1915, and formed No. 3 Ambulance Barge Flotilla, as the D.G.M.S. in May 1915 had reported on the service as

AMBULANCE BARGE USED BY THE BRITISH EXPEDITIONARY FORCE IN FRANCE 1915-1918.



DECK PLAN.



WARD PLAN.

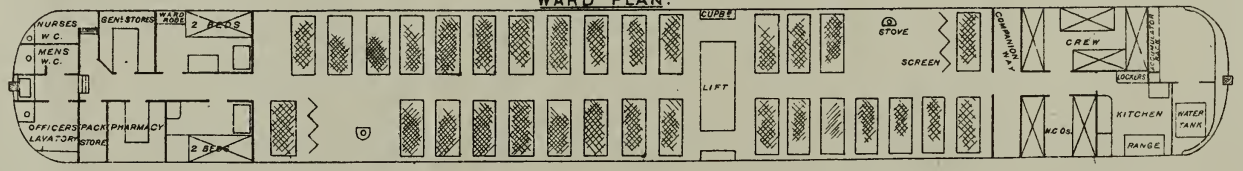


FIG. 97.

Malby & Sons, Lith.

follows :—" By means of these barges a number of severely wounded patients were brought direct from the field ambulance to the stationary hospitals at St. Omer without the suffering and danger entailed to cases of this kind on road or rail." Later it was decided that two more flotillas, Nos. 4 and 5, should be added to the fleet, bringing the total number of ambulance barges up to twenty-four. This number was in service from time to time on the system of canals between Calais and the northern fronts, and on the Somme.

Each barge measured 126 ft. in length with a beam of 16 ft. 7 in., and a moulded depth of about 7 ft. 6 in. They were gutted and cleaned from end to end and fitted with a new floor and inner skin. Skylights and ventilators were fitted and the craft was divided by means of partitions to form a commodious ward for thirty-one beds. Accommodation was also provided for a kitchen, dispensary, a store-room, lavatories and quarters for a medical officer, two nurses, eight R.A.M.C. personnel and three men forming the Inland Water Transport crew. (Fig. 97.) A hand-lift was provided for passing the wounded in and out of the vessel on stretchers, and the crafts were lighted throughout by electricity furnished from a motor generator and accumulators, which also provided current for electric fans. The spaciousness of the ward enabled it to be fitted up in a manner very closely approaching that of a ward in a hospital ashore, and offering almost equal comfort. Ventilation was obtained by means of skylights supplemented by a number of movable hatches.

In October 1915 one vessel was equipped for conveying sixty-nine cases, but it only made one loaded trip as the experiment was not a success ; consequently the barge was re-equipped in the original manner. In 1918, however, when the fighting on the Lys was severe and large numbers of wounded had to be evacuated, some of the barges were converted so as to accommodate sixty cases each, but these barges were not utilized to convey the very seriously wounded.

The Director of Inland Water Transport was responsible for obtaining and fitting out the barges, their maintenance, movement and safe navigation.

The crew on board each barge consisted of an N.C.O. of the Inland Water Transport and two men of the R.E. Only experienced men, usually drawn from the canal service in the United Kingdom, were selected, as it was essential that the personnel should be experts in the handling of barges when in tow of a tug along a narrow waterway, through stone abutments and

bridges, and into and out of the locks. In the early days a tug towed one barge only, but later arrangements were made for two ambulance barges to be allotted to each tug.

In July 1915, it was decided to transfer some of the ambulance barges working in the northern waterways to the River Somme. As the communication between the river and the northern waterways was through territory in the hands of the enemy, the only method of getting the vessels to the Somme was by sea viâ Calais and St. Valery. They could only be despatched when the sea was smooth and the weather suitable for the passage. The first three ambulance barges of No. 3 Flotilla reached Abbeville safely on 19th August 1915 and by the spring of 1916 the other barges of this flotilla and also No. 4 Flotilla had reached the Somme, making a total of twelve barges on that waterway. These flotillas were used during the Somme battles, and patients were embarked at Corbie, and were disembarked at Amiens or Abbeville. The flotillas were returned to the northern waterways in June and July 1917.

Between 20th July and 31st August 1917 when British troops were operating on the Belgian coast, two flotillas were utilized on the Dunkerque–Furnes canal, and conveyed wounded from Adinkerque to St. Omer.

The barges on the northern waterways conveyed patients to Arques, St. Omer, or Calais. The average length of time taken from Bethune to St. Omer was ten and a half hours, from Merville to St. Omer ten hours, and from St. Omer to Calais eleven hours. The vessels travelled only in daylight.

The number of casualties carried in ambulance barges in France was 4,532 in 1915, 26,406 in 1916, 13,602 in 1917 and 25,519 in 1918—a grand total of 70,059. Although the number of cases carried was only a small proportion of the total casualties in France, this method of evacuating wounded was reserved principally for special cases, such as head wounds, fractured thighs, and injuries to the chest. It proved to be a most useful method for the transport of such cases.

River Steamers and Barges in Mesopotamia.

In February 1915 Bengal offered the Mesopotamian Force a hospital barge, which was accepted, but the barge foundered on its voyage to Mesopotamia. Between February and August 1915 communications passed between Mesopotamia and India concerning the use of motor launches to tow mahelas for removing the sick and wounded.

The river transport vessels were then used until April 1916, when three small hospital stern-wheelers, the "Sikkim," "Coromandel," and "Ardlui," of which the two latter were unreliable, became available.

The personnel for the stern-wheelers was provided by one of the casualty clearing stations and by a unit called the Madras Ambulance Unit, for whom the Madras Government had provided the "Coromandel."

Except in a few instances the river steamers were little adapted for sick transport; the smaller types carried 60 stretcher cases on deck, the large 150 cases—the average being about 100 per boat—and with few exceptions the barges gave very poor accommodation. Both steamers and barges were short of latrine accommodation, cooking accommodation and the arrangements for the supply of drinking water were most unsatisfactory. In addition, at the beginning of the hot weather the awnings provided gave insufficient protection from the sun.

There were many grave defects in the organization for utilizing the river transport vehicles in carrying wounded, in the arrangements for preparing, manning and equipping them, until the arrival of Surg.-General Treherne as D.M.S. of the Force in 1916.

The number of steamers then taken up for sick was limited to the best class of vessel only, and sick were only embarked in the best type of barge. Seventeen steamers and forty barges were then available.

The conditions under which the sick were brought from the front began to show a very marked improvement in respect of comfort about the month of August 1916, supplies, equipment and personnel for the River Sick Convoy Unit having become easier to obtain. The arrival of six new "50" class paddlers in the middle of December 1916 and the construction of new types of barge marked the greatest change.* The "50" class boats were large, speedy and powerful, and capable of towing large barges, and it was considered that for purposes of sick transport one of the new boats was equal to two of the older pattern. There were good head-cover, wide deck space, improved latrines, cooking and water arrangements on these boats. Each steamer was provided with a permanent convoy party, and carried medical comforts, dressings and medical stores and equipment for 500 patients, either British and Indian, together or separately. Permanent deck space was allotted for the convoy personnel of the steamers, a dispensary

* Illustrated on p. 306.

was erected on the deck, and it was decided as soon as operations commenced to add two nursing sisters to each steamer. By the end of April 1917 four more of the "50" class boats had arrived and were staffed by the River Sick Convoy Unit parties.

At this time, it was decided to re-arrange the lines of communication river transport as a section of the river between Baghdad and Kut was very shallow and difficult to navigate in the low-water season, which extended from June to the middle of January. A certain number of the lightest draught vessels known as the "90" class, which had been river passenger steamers on the Brahmaputra, was therefore allotted to this portion of the river.

Three "50" class steamers and one of the old light draught paddlers were placed on the Kut–Baghdad run. The sick on these boats were met at Kut and were taken over by the "90" class boats.

At the end of December 1917 the number of vessels in actual use for the evacuation of sick and wounded between Baghdad and Basra was as follows :—ten of the "50" class, five of the "90" class and one hospital river steamer. A stern-wheeler, the "Sikkim," was placed on the section of the river above Baghdad, and brought cases from the front down to the casualty clearing stations.

From March 1917 to the end of the year the specially built hospital river steamers and specially fitted barges were arriving in Mesopotamia, but the delay in refitting them after their long voyage from England and in putting together those which arrived in sections was necessarily considerable.

During 1918 the evacuation by river was carried out by hospital steamers and ambulance paddle transport steamers which had gradually been brought into commission. On the up-river journey the latter were employed in towing barges with supplies and to a small extent in transporting medical stores, officers, nursing sisters and troops, whilst for the return journey the permanent party of the River Sick Convoy Unit on board converted them for purely hospital purposes. For this purpose they carried their complete hospital equipment, but the customary Geneva Cross signs were omitted, the vessels themselves being painted grey. Owing to the extension of active operations to the upper Euphrates, the hospital stern-wheeler, "Ardlui," whose shallow draught and narrow beam made it possible for her to cross the Shinafiya lake and get through the opening in the Hindiyeh barrage, was sent from

Basra to Ramadi to evacuate the casualties from Hit and Ramadi to railhead at Dhibban.

As the various types of hospital craft from England came into commission, they were submitted to considerable criticism locally. The medical authorities in Mesopotamia had stated that the most useful type would be a unit composed of a light draught steamer with alternating paddles and two fitted barges and capable of accommodating up to 500 patients in addition to the crew and medical personnel. It had also been made plain that now that efficient hospitals were located at various points on the Tigris, the necessity for medical and surgical equipment much in excess of that which was available

Fig. 98. H.M. class of river hospital steamer.

on an ambulance train in Europe was not required by river craft transporting sick and wounded between the stations where these various hospitals were located.

The first of the new types to arrive were the twin-screw motor-driven light draught vessels known as the H.M. class. These craft proved unsuitable for the river both from an engineering and navigating point of view and were comparatively little used. They were fitted with hospital and surgical equipment which proved unnecessary and there was considerable difficulty in handling stretcher cases when on board. The accommodation for both men and medical personnel was not suitable for the hot weather. (Figs. 98–100.)

Shortly after the first of these reached Basra, crafts with fixed paddles and drawing up to six feet of water, began to arrive. These were known as the H.P. class and except during

the flood their use was confined to the wider and deeper stretches of the river owing to their deep draught and fixed paddles. Like the H.M. class they carried a great amount of unnecessary equipment and owing to their design, stretcher cases could only be moved from place to place in the wards with difficulty or by actually taking down cots to give room. The roofs of the wards were so low that any man above the average height was continually knocking his head against the lights and fans.

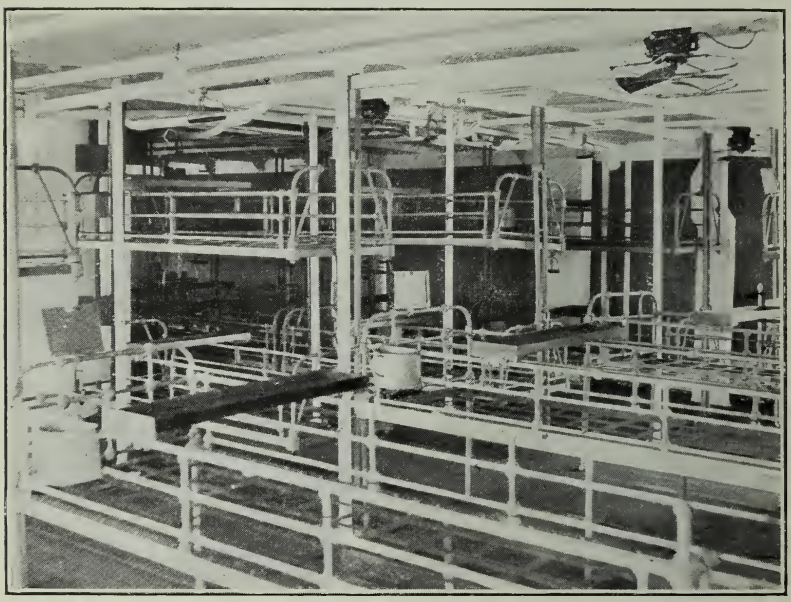


Fig. 99. Ward in H.M. class of steamer showing arrangement of berths which caused difficulty in handling stretcher cases.

During the latter part of 1917 and beginning of 1918, river craft for hospital purposes continued to reach Basra where they were fitted out after their long ocean voyage for the river services. The hospital barges, and two of the stern-wheelers had been sent out by transport steamer in sections and these were put together and the vessels brought into commission at the dockyard of the I.W.T. at Magill.

By the middle of 1918 the following vessels were employed on the Tigris for the transport of the sick and wounded; four motor vessels accommodating 100 patients each; five vessels with fixed paddles accommodating from 120–200 each and two stern-wheelers taking about 140 each. On the

Euphrates one small stern-wheeler carrying 50 patients on the upper waters, and one stern-wheeler taking sick from the posts below the Shinafiya Lake to the hospital at Nasiriya were employed on purely hospital services. These vessels retained the Geneva Convention's distinguishing marks. In addition seven large steamers with alternating paddles and of light draught known as Paddle Ambulances were employed

Fig. 100. Operating theatre on H.M. class of steamer.

on the Tigris. These vessels could accommodate 200 patients without barges, were painted the standard grey colour of the transport services and were used on the up-river journey for towing barges of supplies and forage.

In July 1918 one more type of vessel (Fig.101) was added to the hospital fleet on the river. This craft embodied all the improvements which experience of the earlier vessels sent out from England had shown to be necessary. It was fitted with

alternating paddles at the stern and engines giving over 1,000 horse-power and with the oil tanks full it had a maximum draught of four feet. The ward space and accommodation for medical personnel and crew were ample and the storage accommodation was adequate for all purposes. A gallery was provided round the side of the ship on the main deck obviating the necessity for the crew to pass through the lower wards when working the ship, a fault which had caused great inconvenience in the earlier types.

The table on page 665 gives the main features of the different types of hospital ships used in Mesopotamia. They were designed by Sir J. H. Biles & Co. as troop carriers for the India Office and redesigned for the War Office as hospital vessels.

Fig. 101. H.P. class of hospital steamer.

River Transport in North Russia.

In North Russia, river transport was used on the Dvina which was generally navigable for vessels of six feet draught and in the higher reaches of four and a half feet draught. It was open for traffic from the middle of April to the middle of October. Barges taking up troops were used for carrying sick and wounded back, and hospital steamers and barges were employed in much the same way as in Mesopotamia. The transport by river of sick and wounded was carried out during the later stages of the campaign by the medical services of the Royal Navy. Hospital carriers from six to seven feet draught, numbering eight in all, arrived at Archangel between June and August 1919, and were under the control of the senior naval medical officer. Of three river steamers on the Dvina, two were paddle steamers carrying forty lying down cases each, and the third was a small tug for cross-river transportation.

Hospital Ships.

Class.	Length.	Breadth.	Depth.	H.P.	Speed, Knots.	Draught.	Cot Accommodation.	
							British	Indian
	′ ″	′ ″	′ ″	B.H.P.		′ ″		
(1) H.M. 1–6	160 0	30 0	6 0	300	8	3 5¾	100 or	100
(2) H.P. 2–3	185 0	30 0	7 6	650	—	—	92	28
(3)†H.P. 4–7	218 0	30 0	6 3	300	9	3 6	90 or	96
(4)†H.P. 8–17*	220 0	30 0	6 9	1,100	11·75	4 1	—	94
(5) H.S.W. 10–12	132 0	31 0	4 9	—	—	—	—	100
(6) H.S.W. 13–16	174 6	34 6	6 9	500	9·17	3 6	117 (2 ships)	117 (2 ships)
(7) Hospital Barges 5–8	152 6	25 0	6 6	—	—	—	—	—

† Have independent wheels. * Converted "Medjidieh."

APPENDIX A.

RECOMMENDATIONS OF COMMITTEE APPOINTED IN MARCH 1919 TO CONSIDER ORGANIZATION OF MEDICAL SERVICES FOR OPERATIONS IN MESOPOTAMIA.

1. *Formation of Hospital Corps.*—The Committee are of opinion that all Indian subordinate personnel attached to medical units in Mesopotamia should belong to a special corps, and that men now classed as S. and T. and regimental followers should be enrolled in it forthwith. This Hospital Corps would include the Army Bearer Corps personnel, ward orderlies, writers, hospital storekeepers and their assistants, cooks, bhistis, artificers, ward servants, washermen and sweepers. This suggestion is based on Army Instruction, India, No. 1343, of 1918.

All such personnel should be given the status of " Indian other ranks," with clothing, rations and accommodation on the same scale as combatants.

2. Medical units in Mesopotamia should be linked to depôts in India—reinforcements for a unit in Mesopotamia should be supplied by the depôt with which that unit is linked. This would greatly simplify questions of pay, promotion, separation allowances and records of service.

3. The Hospital Corps as above should be given a specially designed webbing equipment to carry greatcoat, blanket, haversack, canteen and water-bottle. Each man of the Army Bearer Corps in addition should carry both a kukri and an entrenching tool, and those attached to field ambulances should carry two sandbags per man.

4. It should be suggested to Government of India that each Army Bearer Corps company should be a " Class Company," *e.g.*, Gurkhas, Garhwalis, Poorbeahs, Mahomedans. This would simplify clothing and messing arrangements in the field.

Field Ambulances.

1. The equipment of combined field ambulances has been brought up to date by the addition of (*a*) a serum pannier, (*b*) a special surgical instrument pannier, (*c*) a canteen for sick officers.

2. The English pattern of field medical panniers " A " and " B " has been selected as the most suitable, the remaining panniers and boxes of the Indian pattern have been considered the best.

3. Having regard to the large number and value of the transport animals, the Committee recommends that the four shoeing smiths allotted to a field ambulance should include one British farrier N.C.O.

4. As in British war establishments, the combined cavalry field ambulance has been reduced to two sections instead of four.

5. The cavalry field ambulance has been allotted limbered G.S. wagons, and it has been found by experience that owing to the bulky nature of medical equipment these vehicles are very suitable if fitted with raves. Raved limbered G.S. wagons should be officially recognized as the standard vehicle for cavalry field ambulances.

6. Cavalry field ambulances have been allotted one G.S. wagon per section to carry personnel. Dismounted men cannot possibly keep up with cavalry on the move. This suggestion is supported by the G.O.C. of the 3rd and 7th Cavalry Brigades.

Sanitary Section.

The Committee strongly recommend that :—

1. The following units be abolished : (1) Indian Divisional Sanitary Section, (2) Indian Sanitary Section for L. of C., (3) Divisional Water Unit, (4) Disinfecting Section.

2. One combined unit, a " combined sanitary section " of four sanitary squads, be instituted. This sanitary section combines the essential personnel and equipment of the units noted in paragraph 1, and is suitable for a division or for duty on the L. of C. When attached to the latter, all transport, except the Ford motor van and one A.T. cart could be withdrawn.

3. All combatant units should have one A.T. cart for sanitary appliances added to their war establishments.

4. Each " combined sanitary section " attached to a division should be supplied with a disinfector on a motor lorry. This disinfector to be made on the principle of a railway steam disinfecting van, as a Thresh or other type of disinfector has proved unsatisfactory in the field.

5. A " combined sanitary section " should be commanded by a medical officer of the rank of major. The second officer might be a combatant, but should have received some previous training in engineering and field sanitation.

Sanitary Squad of a Cavalry Brigade.

Experience has shown that with dismounted personnel and equipment on horse-drawn vehicles the sanitary squad is useless for water supply when on the march. Three Ford motor vans have been added to the transport. These will enable personnel and equipment to accompany the brigade sufficient to provide cleared and sterilized water.

Motor Ambulance Convoy.

The question of the War Establishment and Mobilization Store Table of the R.A.S.C. has not been considered.

Note.—There are two units in which the efficiency has been impaired by friction between commanding and subordinate officers. These are a sanitary section and motor ambulance convoy. In both these units it should be laid down that all officers and personnel, whether medical, R.E. or R.A.S.C. or combatant, are subordinate to and directly responsible to the officer commanding, who should have the rank of major. Subordinate officers in these units should not be allowed to approach their directorate except through their commanding officer.

Combined Casualty Clearing Station.

The Committee decided that field ambulance pattern boxes and panniers were neither necessary nor suitable for a casualty clearing station. Economy of space is not essential. The inconvenience of having similar articles distributed in small quantities through a variety of packages is considerable. Articles of a similar nature have been brought together and packed in waterproof-lined wicker baskets of the pattern of an English laundry basket. It was presumed that a mobile X-ray section would be attached if necessary, and that the unit would be in close touch with an advanced depôt medical stores. A scale of surgical equipment found necessary by experience has been added to the store tables.

(General) Hospitals.

1. The title of " Stationary Hospital " should be abolished.

2. All hospitals should be " General Hospitals."

3. As in the case of the Combined Casualty Clearing Stations, the field ambulance pattern panniers and boxes have been abolished. Drugs and dressings have been bulked and dispensary equipment added. Special operating theatre equipment has been allotted as distinct from that in use in the wards.

4. It has been presumed that an X-ray section and first-class laboratory will be attached, and that water and lighting arrangements have been arranged in existing buildings.

APPENDIX B.

MEDICAL UNIT OF A MOBILE COLUMN IN NORTH RUSSIA.

I.—*Establishment and Equipment.*

Detail.	Personnel.					Sledges		Tents.		Equipment, etc. (Self-contained for 15 days, with fodder for 10 days).														Horses.	Fodder.	Reindeer.
	Officers.	Sergeants.	Corporals.	Privates.	Total.	Antarctic.	Ambulance.	Large.	Small.	Sleeping bags.	Mess tins and spoons.	Matches (boxes).	Dixies.	Candles.	Axes.	Saw.	Shovels.	Special rations.	Medical gear.	Lamp.	Primus.	Oil.			
														lb.				lb.	lb.			gls.			
One Unit	1	–	–	6	7	1	–	2	1	7	7	7	2	2	2	1	2	175	100	1	1	2	1	–	–
Extras	–	–	–	–	–	–	10	–	–	20††	10	10	2	–	–	–	–	250	–	–	–	–	–	140	20
Total.. ..	1	–	–	6*	7	1†	10‡	2	1	27	17§	17§	4‖	2	2	1	2	425¶	100	1	1	2	1	140	20**

* 4 R.A.M.C. orderlies. 2 A.S.C. drivers.
† 1 sledge for gear.
‡ 10 sledges for wounded.
§ 7 for unit personnel. 10 for Lapp drivers of ambulance sledges.
‖ 2 for unit personnel. 2 for Lapp drivers of ambulance sledges.
¶ 175 lb. for unit. 250 lb. for Lapps.
** 10 to draw ambulance sledges; 10 to break trail.
†† 20 special bags for wounded.

Ordinary rations for unit for 5 days (122·5 lb.) carried by H.Q.

MEDICAL UNIT OF A MOBILE COLUMN IN NORTH RUSSIA—*cont.*

II.—*Details of Equipment.*

Medical.	R.A.O.C. Supplies.	R.A.S.C. Supplies.
Medical Companion .. 1	Sledge, antarctic, 11 ft. 1	Paraffin .. gal. 2
Sterilizer 1	Do. do. 15 ft. 10	Methylated Spirits, pt. ½
Roll, instruments .. 1	Do. Russian pattrn. 3	Candles .. lb. 5
Forceps, tooth roll 1	Tents, Mob. Col. pattrn., large .. 2	Brandy .. bottle 1
Dressings—	Do. do. small 1	Oxo .. lb. 2
Wool .. lb. 10	Floorcloths for tents large 2	Milk .. tins 10
Lint .. ,, 1	Do. do. small 1	Tea .. lb. 2
Gauze (compressed) yds. 30	Bags, sleeping (for wounded) .. 20	Sugar .. ,, 4
Jaconet .. ,, 1	Clothing, Mob. Col. scale, sets complete 5	
Adhesive plaster, 1 in. rolls 12	Stretchers 10	
Bandages, roller .. 50	Blankets 25	
Do. triangular 50	Stomach warmers 20	
Shell dressings .. 20	First field dressings 50	
Splints—	Camp kettles .. 2	
Gooch .. rolls 2	Saucepans 2	
Thomas 2	Axes, Canadian .. 2	
Zinc, perforated strips 6	Do. light, hand .. 1	
Adhesive plaster, broad, rolls .. 2	Saw, hand, ripping 1	
Tourniquets, rubber 2	Shovels 2	
Flannel .. yds. 2	Lamps, hurricane 2	
British Red Cross Society Supplies—	Stove, Primus .. 1	
Shell dressings .. 12	Torches, electric .. 2	
Thermos flasks .. 2	Kettle 1	
Sleeping socks prs. 20	Tin shears 1	
Frostbite socks ,, 6	Petrol tin, 2-gal. .. 1	
	Cups, feeding .. 2	
	Urine bottle .. 1	
	Bed pan 1	
	Stove, Beatrice .. 1	
	Mugs, pint, enamel 10	
	Plates, enamel .. 10	
	Knives 10	
	Forks 10	
	Spoons 12	
	Mess tins 2	
	Rope, lashing, coil ½	
	Knives, hunting, 6 in. 5	
	Harness, man, sets 5	
	This number allowed for equipment only. Local supplies had to be used for the evacuation of wounded.	

MEDICAL UNIT OF A MOBILE COLUMN IN NORTH RUSSIA—*coni.*

III.—*Equipment of a Relay Post.*

Medical.		R.A.O.C. Supplies.		R.A.S.C. Supplies.	
Medical companion ..	1	Sledge, antarctic, 11 ft.	1	Paraffin .. gal.	2
Dressings—		Do. Russian patt.	2	Methylated spirits, pt.	½
Wool .. lb.	12	Tent, Barbateau do.	1	Candles .. lb.	5
Lint .. ,,	1	Floorcloth for same	1	Brandy .. bottle	1
Gauze .. yds.	30	Bags, sleeping, Mob. Col. pattern ..	4	Oxo .. lb.	1
Jaconet .. ,,	1	Clothing, Mob. Col. scale	4	Milk .. tins	6
Adhesive plaster, 1 in. rolls	12	Bags, sleeping (for wounded) ..	2	Tea .. lb.	2
Bandages, roller ..	50	Stretchers.. ..	2	Sugar .. ,,	6
Do. triangular	12	Blankets	10		
Shell dressings ..	12	Stomach warmers	2		
Tourniquet ..	1	First field dressings	25		
Splints—		Camp kettles ..	2		
Gooch	2	Axes, Canadian ..	2		
Thomas	2	Saws, hand, ripping	1		
Zinc, perforated, strips	6	Shovels	2		
Flannel .. yds.	3	Lamps, hurricane	2		
Adhesive plaster, broad, rolls ..	2	Stove, Primus ..	1		
B.R.C.S. Supplies—		Torches, electric ..	2		
Shell dressings ..	12	Kettle	1		
Muff warmers ..	40	Tin shears.. ..	1		
Sleeping socks, prs.	12	Petrol tin, 2-gal. ..	1		
Frostbite socks, ,,	2	Cups, feeding ..	2		
Thermos flask ..	1	Urine bottle ..	1		
		Bed pan	1		
		Stove, Beatrice ..	1		
		Saucepans.. ..	2		
		Mugs, pint, enamel	10		
		Plates, enamel ..	10		
		Knives	10		
		Forks	10		
		Spoons	12		
		Mess tins	2		
		Rope, lashing, coil	¼		
		Knives, hunting, 6 in.	4		
		Harness, man, sets	4		
		Axe, light, hand ..	1		

APPENDIX C.

Awards of the Victoria Cross, Albert Medal, Distinguished Service Order, Military Cross, Military Medal, Distinguished Conduct Medal and Meritorious Service Medal to Officers and other Ranks of the Medical Services during the War.

I.—VICTORIA CROSS.

France.

Name.	*London Gazette.*	
Captain H. S. Ranken, R.A.M.C.	16.11.14	For tending wounded in the trenches under rifle and shrapnel fire at Hautavesnes on 19th September, and on 20th September 1914, continuing to attend to wounded after his thigh and leg had been shattered. (He has since died of his wounds.)
Lieut. A. M. Leake, V.C., R.A.M.C.	18. 2.15	Awarded a bar to the Victoria Cross for most conspicuous bravery and devotion to duty throughout the campaign, especially during the period 29th October to 8th November 1914 near Zonnebeke in rescuing, whilst exposed to constant fire, a large number of the wounded who were lying close to the enemy's trenches. This officer was awarded the V.C. on 13th May 1902.
Captain F. A. C. Scrimger, C.A.M.C. (att. 14th Bn. Royal Montreal Regiment).	23. 6.15	On the afternoon of 25th April 1915, in the neighbourhood of Ypres, when in charge of an advanced dressing station in some farm buildings, which were being heavily shelled by the enemy, he directed under heavy fire the removal of the wounded, and he himself carried a severely wounded officer out of a stable in search of a place of greater safety. When he was unable alone to carry this officer further, he remained with him under fire till help could be obtained. During the very heavy fighting between 22nd and 25th April, Captain Scrimger displayed continuously day and night the greatest devotion to his duty among the wounded at the front.

I.—VICTORIA CROSS—*cont.*

France—cont.

Name.	*London Gazette.*	
Lieut. G. A. Maling, R.A.M.C.	18.11.15	For most conspicuous bravery and devotion to duty during the heavy fighting near Fauquissart on 25th September 1915. Lieut. Maling worked incessantly with untiring energy from 6.15 a.m. on the 25th till 8 a.m. on the 26th, collecting and treating in the open under heavy shell fire more than 300 men. At about 11 a.m. on the 25th he was flung down and temporarily stunned by the bursting of a large high explosive shell which wounded his only assistant and killed several of his patients. A second shell soon after covered him and his instruments with debris, but his high courage and zeal never failed him and he continued his gallant work single-handed.
Captain J. L. Green, R.A.M.C. (att. 1/5th Bn. Notts & Derby Regt., T.F.).	5. 8.16	For most conspicuous devotion to duty. Although himself wounded, he went to the assistance of an officer who had been wounded and was hung up on the enemy's wire entanglements, and succeeded in dragging him to a shell-hole, where he dressed his wounds, notwithstanding that bombs and rifle grenades were thrown at him the whole time. Captain Green then endeavoured to bring the wounded officer into safe cover, and had nearly succeeded in doing so when he was himself killed.
Captain W. B. Allen, M.C., R.A.M.C. (att. 246th W. Riding Brigade, R F.A. (T.F.)).	26.10.16	For most conspicuous bravery and devotion to duty. When gun detachments were unloading high explosive ammunition from wagons which had just come up, the enemy suddenly began to shell the battery position. The first shell fell on one of the limbers exploding the ammunition and caused several casualties. Captain Allen saw the occurrence, and at once with utter disregard of danger ran straight across the open, under heavy shell fire, commenced dressing the wounded

I.—VICTORIA CROSS—*cont.*

France—cont.

Name.	*London Gazette.*	
Captain W. B. Allen, M.C., R.A.M.C. (att. 246th W. Riding Brigade, R.F.A. (T.F.)).—*cont.*	26.10.16	and undoubtedly by his promptness saved many of them from bleeding to death. He was himself hit four times during the first hour by pieces of shell, one of which fractured two of his ribs, but he never even mentioned this at the time, and coolly went on with his work till the last man was dressed and safely removed. He then went over to another battery and attended to a wounded officer. It was only when this was done that he returned to his dugout and reported his own injury.
Captain Noel G. Chavasse, M.C., R.A.M.C. (att. 1/10th Bn. Liverpool Regiment (T.F.)).	26.10.16	For most conspicuous bravery and devotion to duty. During an attack he attended the wounded in the open all day under heavy fire, frequently in view of the enemy. During the ensuing night he searched for wounded on the ground in front of the enemy's lines for four hours. Next day he took one stretcher-bearer to the advanced trenches and under heavy shellfire carried an urgent case for 500 yards into safety, being wounded in the side by a shell splinter during the journey. The same night he took up a party of 20 volunteers, rescued three wounded men from a shell-hole 25 yards from the enemy's trench, buried the bodies of two officers, and collected many identity discs, although fired on by bombs and machine-guns. Altogether he saved the lives of some 20 badly wounded men, besides the ordinary cases which passed through his hands. His courage and self-sacrifice were beyond praise.
Captain Noel G. Chavasse, V.C., M.C., R.A.M.C. (att. 1/10th Bn. Liverpool Regiment (T.F.)).	14. 9.17	*Awarded a Bar to the Victoria Cross.* For most conspicuous bravery and devotion to duty when in action. Though severely wounded early in the action whilst carrying a wounded soldier to the dressing

I.—VICTORIA CROSS—*cont.*

France—cont.

Name.	*London Gazette.*	
Captain Noel G. Chavasse, V.C., M.C., R.A.M.C. (att. 1/10th Bn. Liverpool Regiment (T.F.)).—*cont.*	14. 9.17	station, Captain Chavasse refused to leave his post, and for two days not only continued to perform his duties, but in addition went out repeatedly under heavy fire and searched for and attended to the wounded who were lying out. During these searches, although practically without food during this period, worn with fatigue and faint with his wound, he assisted to carry in a number of badly wounded men over heavy and difficult ground. By his extraordinary energy and inspiring example, he was instrumental in rescuing many wounded who would otherwise have undoubtedly succumbed in the bad weather conditions. This devoted and gallant officer subsequently died of his wounds.
Captain H. Ackroyd, M.C., R.A.M.C. (att. 6th Bn. Royal Berks Regiment).	6. 9.17	For most conspicuous bravery. During the recent operations Captain Ackroyd displayed the greatest gallantry and devotion to duty. Utterly regardless of danger, he worked continuously for many hours up and down in front of the line tending the wounded and saving the lives of officers and men. In so doing he had to move across the open under heavy machine-gun, rifle and shell fire. He carried a wounded officer to a place of safety under very heavy fire. On another occasion he went some way in front of our advanced line and brought in a wounded man under continuous sniping and machine-gun fire. His heroism was the means of saving many lives and provided a magnificent example of courage, cheerfulness and determination to the fighting men in whose midst he was carrying out his splendid work. This gallant officer has since been killed in action.

I.—VICTORIA CROSS—*cont.*

France—cont.

Name.	*London Gazette.*	
Captain B. S. Hutcheson, C.A.M.C. (att. 75th Bn. 1st Central Ontario Regiment).	14.12.18	For most conspicuous bravery and devotion to duty on 2nd September, when under most intense shell, machine-gun and rifle fire, he went through the Queant-Drocourt support line with the battalion. Without hesitation and with utter disregard of personal safety, he remained on the field until every wounded man had been attended to. He dressed the wounds of a seriously wounded officer under terrific machine-gun and shell fire, and, with the assistance of prisoners and of his own men, succeeded in evacuating him to safety, despite the fact that the bearer party suffered heavy casualties. Immediately afterwards he rushed forward, in full view of the enemy, under heavy machine-gun and rifle fire, to tend a wounded sergeant, and, having placed him in a shell-hole, dressed his wounds. Captain Hutcheson performed many similar gallant acts, and, by his coolness and devotion to duty, many lives were saved.

Mesopotamia.

Name.	*London Gazette.*	
Captain J. A. Sinton, I.M.S.	21. 6.16	For most conspicuous bravery and devotion to duty. Although shot through both arms and through the side, he refused to go to the hospital, and remained, as long as daylight lasted, attending to his duties under very heavy fire. In three previous actions, Captain Sinton displayed the utmost bravery.

I.—VICTORIA CROSS—*cont.*

Palestine.

Name.	*London Gazette.*	
Captain J. F. Russell, M.C., R.A.M.C. (T.F.). (att. 1/6th Bn. Royal Welsh Fusiliers).	11. 1.18	Tel el Khuweilfeh, Palestine, 6th November 1917. For most conspicuous bravery displayed in action until he was killed. Captain Russell repeatedly went out to attend the wounded under murderous fire from snipers and machine-guns, and, in many cases where no other means were at hand, carried them in himself, although almost exhausted. He showed the highest possible degree of valour.

II.—ALBERT MEDAL AWARDS.

France.

Name.	*London Gazette.*	
Corporal James Webb, R.A.M.C.	16. 5.16	*Awarded the Albert Medal of the Second Class.* On 2nd January 1916, during a heavy bombardment, Webb and Driver R. Foley, R.F.A., acting on their own initiative, left a place where they were safe, and ran out to bring two wounded French civilians into a dug-out. They got both men into a cellar. During this operation heavy shells were falling all around them, and a motor cyclist, who was assisting to bring in the second man, was killed. Military decorations could not be awarded in these cases, as the acts of gallantry were not performed in the face of the enemy.
49809 Pte. (Acting L/Cpl.) J. Collins, R.A.M.C.	1. 1.18	*Awarded the Albert Medal in Gold.* On 11th November 1917, near an advanced dressing station in France, a lunatic soldier escaped from his escort and ran away along a trench. Collins ran after him, and when he got near him

II.—ALBERT MEDAL AWARDS—*cont.*

France—cont.

Name.	*London Gazette.*	
49809 Pte. (Acting L/Cpl.) J. Collins, R.A.M.C.—*—contd.*		the man threatened to throw a bomb at him. Collins closed with the man, who then withdrew the pin from the bomb and let it fall in the trench. In an endeavour to save the patient and two other soldiers who were near, Collins put his foot upon the bomb, which exploded killing the lunatic, and injuring Collins severely, fortunately the two soldiers were not hurt. Collins, who could easily have got out of the way, ran the gravest risk of losing his life in order to save others.
70270 Pte. S. A. Bodsworth, R.A.M.C.	11. 1.18	*Awarded the Albert Medal.* On 10th April 1917 H.M. Hospital Ship " Salta " was sunk in Havre Roads. His Majesty's Ship " Druid " proceeded to render assistance, and got alongside a swamped boat of the " Salta." All the occupants of the boat were rescued except a hospital sister and Pte. Bodsworth. The former was so exhausted that she was unable to hold the ropes thrown to her, and eventually became unconscious. Although he might have been rescued, Pte. Bodsworth persisted in remaining in the boat with the sister, and, after she had fallen overboard and had been hauled back again, he finally succeeded in placing a line round her body, by means of which she was hauled on board the " Druid." Very considerable risk was incurred by Pte. Bodsworth in rendering the service on account of the rough sea which prevailed at the time.

III.—DISTINGUISHED SERVICE ORDER.

	Theatre of War not stated.	France.	Egypt and Palestine	Gallipoli.	Mesopotamia.	Salonika.	Italy.	E. Africa	N. Russia.	India.	Total.
R.A.M.C. ..	311 9 bars	138 16 bars	19	1	9	9	9	2	1	–	499 25
I.M.S.	9	8	–	–	7	–	–	–	–	1	25
C.A.M.C. ..	20	18 4 bars	–	–	–	–	–	–	–	–	38 4
A.A.M.C. ..	48	23	5	1	–	–	–	–	–	–	77
N.Z.M.C. ..	6	4	1	2	–	–	–	–	–	–	13
S.A.M.C... ..	13	1	–	–	–	–	–	2	–	–	16
E.A.M.C. ..	1	–	–	–	–	–	–	–	–	–	1
Totals ..	408 9 bars	192 20 bars	25	4	16	9	9	4	1	1	669 29

IV.—MILITARY CROSS.

	Theatre of War not stated.	France.	Egypt and Palestine.	Gallipoli.	Mesopotamia.	Salonika.	Italy.	E. Africa.	N. Russia.	India Army of Black S. Afghan War.	Total.
	Offs. *W.Os.*	*Offs.* *W.Os.*									*Offs.* *W.Os.*
R A.M.C.	837 6 58 one bar 2 two bars	515 22 101 one bar 20 two bars 1 three bars	22	1	18	31	15	9	5 2 bars	1 India 1 A.B.S. 1 A.W.	1,456 28 161 one bar 22 two bars 1 three bars
I.M.S. ..	21 –	11 –	3	–	12 1 bar	–	–	1	–	1 India 1 A.W.	50 – 1 bar
C.A.M.C.	55 – 1 bar	75 – 14 bars		–	–	–	–	–	–	–	130 – 15 bars
A.A.M.C.	59 – 3 bars	38 – 4 bars	2	–	–	–	–	–	–	–	99 – 7 bars
N.Z.M.C.	20 –	7 –	–	–	–	–	–	–	–	–	27 –
S.A.M.C.	10 – 1 bar	3 –	–	–	–	–	–	2	–	–	15 – 1 bar
E.A.M.C.	1 –	– –	–	–	–	–	–	1	–	–	2 –
W.A.M.C.	– –	– –	–	–	–	–	–	3	–	–	3 –
Totals ..	1,003 6 63 one bar 2 two bars	649 22 119 one bar 20 two bars 1 three bars	27	1	30 1 bar	31	15	16	5 2 bars	5	1,782 28 185 one bar 22 two bars 1 three bars

V.—MILITARY MEDAL.

	Theatre of war not stated.	France.	Egypt and Palestine	Gallipoli.	Mesopotamia.	Salonika.	Italy.	E. Africa.	N. Russia.	Total.
R.A.M.C. ..	1,525 39 one bar 1 two bars	1,414 148 one bar 3 two bars	2	–	2 1 bar	16 1 bar	28 4 bars	–	15 2 bars	3,002 195 one bar 4 two bars
Nursing Service	3	–	–	–	–	–	–	–	–	3
C.A.M.C... ..	–	56	–	–	–	–	–	–	–	56
A.A.M.C. ..	–	–	2	–	–	–	–	–	–	2
S.A.M.C. ..	–	–	–	–	–	–	–	1	–	1
Totals ..	1,528 39 one bar 1 two bars	1,470 148 one bar 3 two bars	4	–	2 1 bar	16 1 bar	28 4 bars	1	15 2 bars	3,064 195 one bar 4 two bars

VI.—DISTINGUISHED CONDUCT MEDAL.

	Theatre of war not stated.	France.	Egypt and Palestine	Gallipoli.	Mesopotamia.	Salonika.	Italy.	E. Africa.	N. Russia.	P/W Camp.	Total.
R.A.M.C. ..	191 11 bars	156 8 bars	12	10	–	6	1	10	1	8	395 19 bars
I.S.M.D... ..	–	3	–	–	–	–	–	–	–	–	3
C.A.M.C. ..	–	7 1 bar	–	–	–	–	–	–	–	–	7 1 bar
A.A.M.C. ..	1	2	–	–	–	–	–	–	–	–	3
N.Z.M.C. ..	–	–	–	–	–	–	–	–	–	–	–
S.A.M.C... ..	3	–	–	–	–	–	–	–	–	–	3
E.A.M.C. ..	1	–	–	–	–	–	–	–	–	–	1
Totals ..	196 11 bars	168 9 bars	12	10	–	6	1	10	1	8	412 20 bars

VII.—MERITORIOUS SERVICE MEDAL.

Royal Army Medical Corps.

Theatre of war not stated	214	
	1	bar
France	661	
Egypt and Palestine	61	
Mesopotamia	25	
Salonika	58	
Italy	34	
Mediterranean	1	
East Africa	3	
India	6	
North Russia	19	
South Russia	11	
Army of the Black Sea	8	
South Persia	2	
P./W. Camp	6	
Singapore	1	
Malta	1	
Total	1,111	
	1	bar

INDEX.

Adamson, Col. H. M. : 174.

Aden Protectorate : description of, 505–6 ; hospitals and other units in, 505, 507, 508, 510 ; operations in, 505–9, 510–1 ; transport in, 506, 508, 510 ; supplies of water and ice in, 507, 509 ; conservancy in, 509 ; diseases in, 509, 510 ; medical administration in, *ib.* ; embarkation duties in, 510 ; supply of fruit and vegetables in, 511.

Aders, Dr. W. M. : 501.

Administration, Medical :

In Gallipoli : of Mediterranean Expeditionary Force, 1–2, 57 ; in the Anzac Corps, 24 ; on the beaches, 35 ; difficulties of D.D.M.S., Mudros, 36 ; appointment and duties of P.D.M.S. in the Mediterranean, 37–8 ; Hospital Transport Officer appointed by the Admiralty, creating dual control, 38–40 ; appointment of consulting specialists, 43 and *n*, 57.

In Macedonia : 73–5 ; surgical groups organized, 95 ; medical personnel, 99–100 ; minimum establishment of medical officers, 99 ; liaison with French for the evacuation of Serbian casualties, 101–2 ; after the Armistice with Bulgaria, 150, 161, 162 ; sanitary committees, 160–1.

In Mesopotamia : lack of co-operation in, 167, 193, 203, 204, 206, 216–7, 223, 316, 339, 386, 387, 397 ; in 1915, 174 ; *merits and defects of*, 178–9, 182, 183, 188–9, 193 ; lack of sanitary sections and dental surgeon, 182 ; of the Kut relieving force (Tigris Corps), 203, 204, 217 ; *difficulties due to system of embarkation at Marseilles*, 203, 217 ; *breakdown of medical arrangements*, 216–7, 229–31 ; *method of using field ambulances as casualty clearing stations*, 223 ; *changes made in*, 249 ; arrangement for exchange of prisoners at fall of Kut, 245 ; appointment of Surg.-Gen. Treherne and reorganization of medical services, 246, 247, 248, 335–9 ; on the lines of communication, 1916, 251–3 ; nursing sisters, 255, 260 ; difficulties and measures adopted in dealing with reinforcements, 258, 259 ; medical reinforcement camp opened, 259 ; in Tigris Force, 275–6, 285–6 ; schemes proposed by A.D.M.S. at Nasiriya for safeguarding the health of troops, 310–1 ; breakdown of medical arrangements at Nasiriya due to A.D.M.S. not being informed of impending action, 316 ; diagram showing organization of, in 1917, 337 ; of new Indian divisions, 375 ; in 15th Division on the Euphrates, 1917, 381 ; lessons of operations in Upper Mesopotamia, 397–9.

In Persia : in North Persian Force, 402.

In East Africa : on amalgamation of the forces, 422–3 ; prior to amalgamation, 423–4 ; of African Bearer Corps, 424 ; of areas, 426 ; in Uganda, *ib.* ; defects of, in 1916, 443, 466–7 ; lack of co-operation between combatant and, *ib.*, 458 ; *in Kilwa-Lindi operations*, 485, 487–8 ; personnel absorbed *in improvised units*, 467, 468 ; *in hospitals for carriers*, 492 ; want of care for mechanical transport personnel, 474 ; of African Native Medical Corps, 496 ; diagram showing organization in 1917, *to face p.* 500 ; for carriers, 500 ; absence of means for combating spread of disease, 500–1 ; defects of sanitary and, reported by Maj.-Gen. Pike and Col. Balfour, 503.

In Aden : 509–10.

In North Russia : 515, 516, 540 ; of nursing sisters, 532 ; shortage of personnel in Murmansk, 539 ; sanitary precautions for thaw, 544–5 ; division of responsibility between naval and military, 548–9 ; distribution of R.A.M.C. personnel before evacuation, 549–51.

Advisory Committee (Col. Hunter's) for the Prevention of Epidemics : 113.
Adye, Maj.-Gen. J. : 64.
African Bearer Corps : 424.
African Native Medical Corps : 475, 477 ; origin and development of, 493–6 ; photograph of parade of, 494.
Ahwaz : occupation of, 170 ; operations on the Karun beyond, 189–90.
Aitken, Maj.-Gen. A. E. : 420.
Alcohol : in North Russia, 534–5.
Aldridge, Lt.-Col. A. R. : 58, 74 ; designs mosquito net, 108.
Alexandria : as base for operations on the Gallipoli Peninsula, 1, 2, 12, 40 ; *time taken by ships on return journey to*, 35.
Algiers : similarity of French Expedition to, in 1830 to the Dardanelles Expedition, 29*n*.
Allen, Maj. H. R. : 563.
Allenby, Gen. : 375.
Allied Forces, British Medical Services with : with Serbian army, 101–3, 152–3 ; with Hellenic Army, 103–4 ; with other allies in Macedonia, 104 ; Military Mission in South Russia, 157–9.
Amade, Gén. d' : 2 ; losses amongst his troops, 32.
Amara : operations leading to occupation of, 183–5 ; medical situation at, *in 1915*, 186–9, 196 ; *in 1916 during reorganization*, 251–2, 253–4 ; as base hospital area for the Tigris Force, 321 ; *medical units in, in April, 1917*, 346 ; *in 1918*, 356.
Ambulance Tongas : Benares, in Mesopotamia, 288, 289, 612–3 ; bullock, 508, 613 ; *photograph of*, 289.
Ambulance Trains : photograph of Decauville, in Macedonia, 71 ; British and Greek, in Macedonia, 79–80 ; Greek coaches used in withdrawal from Serbia, 116 ; goods vans used as, 117 ; in Battle of Doiran *in 1917*, 134–5 ; *in 1918*, 144 ; Bulgarian, used in evacuating casualties, 150, 152 ; Russian, *in Trans-Caspia*, 155 ; *in Trans-Caucasia*, 156–7 ; with military mission in South Russia, 157 ; in Mesopotamia, 314, 338 ; *trucks or trolleys used on railways for the evacuation of casualties*, 276–7, 334, 373, 651–2 ; *organization and establishment of*, 643–4 ; in East Africa, 424, 429, 442, 477 ; *photograph of*, 476 ; in North Russia, 531, 542, 547 ; *photographs of*, 532, 533 ; *railway coach as mobile dressing station*, 547.
In France : organization and development of, 628–43 ; arrangements for shipping of, 629 ; committees for supply of, 630 ; reorganization of trains formed of French rolling stock, 632–3 ; recommendations of Advisory Committee in France, 1914, 633–4 ; appointment and duties of inspecting officer, 636–7 ; final composition of standard train, 638–41 ; designed for Macedonia, 639–41 ; on the Mediterranean lines of communication, 641–2 ; for Italy and Egypt, 642 ; for prisoners of war, *ib.* ; temporary, 644–7 ; on light railways, 649–51.
Ambulance Transport :
In Gallipoli : 24–5, 45–6 ; photographs of, 9, 31, 48.
In Macedonia : photographs of, 71, 77, 105, 123, 124 ; organization of, 75–8, 589–97, 609, 614 ; exhibition of types of, 75–6 ; reorganization of, of a field ambulance, 78 ; in the entrenched camp positions, 1915–16, 82 ; relative merits of pack, on Doiran front, 121–2 ; local craft on Lake Doiran, 652–3.
In Trans-Caucasia : 157.
In South Russia : with military mission, 157.
In Mesopotamia : barge used, 164 ; first wheeled transport supplied to field ambulance, native carts at Ahwaz, 170 ; riding mules as, 171 ; native craft used on inland waters, 171, 179, 314, 654–5 ; *photographs illustrating*, 179, 389 ; *equipment of, for advance to Amara*, 185 ; army transport carts as, 172, 204, 209 ; *in retreat from Dujaila Redoubt*, 222, 223–4, 614, 615 ; available in early operations, 179 ; motor ambulance cars (*q.v.*) ; hospital ships, 182, 211, 214–6, 269–71 ; river

steamers as, 185, 187, 191, *et seq.*; *improvement in*, 267–8; *River Sick Convoy Unit*, 268–70; *development and organization of*, 658–64; photographs of, 180, 208, 230, 269, 289, 324, 338, 361; motor launches, 198, 227, 655–6; *increase of*, 336; wheeled, from France, 225; with the Tigris Force, December, 1916, 278–9; *subsequent allotment of*, 288–90; on railways, 334, 643–4, 651–2.
In Persia: 407.
In East Africa: 424, 431, 498–9; photographs of, 474, 476, 482, 498, 499, 500.
In Aden: 506, 508, 510.
In North Russia: 523–4, 546–7, 548–9; photographs of, 522, 524, 525, 528–33, 546, 549.
Stretchers, 560–79 (*q.v.*); wheeled stretcher carriers, 579–88 (*q.v.*); litters and travois, 589–94 (*q.v.*); mule pack, 594–6; *mule harness*, 596–7; camel, 598–603; sledges, 604–7 (*q.v.*); horsed ambulance wagons, 607–12 (*see* Ambulance Wagons, Horsed); tongas, 612–3 (*q.v.*); improvised ambulance wagons, 614–7; motor ambulance cars, 617–27 (*q.v.*); motor lorries and buses, 627; cable railways, 627–8; ambulance trains, 628–44 (*q.v.*); *temporary*, 644–7; tramways and light railways, 647–52 (*q.v.*); on inland waters: *local craft*, 652–5; *motor launches*, 655–6; *ambulance barges in France*, 656–8; *river steamers and barges in Mesopotamia*, 658–64; *in North Russia*, 664.
Ambulance Wagons, Horsed: 75, 78, 82, 157; in Mesopotamia, 225, 278, 609; *numbers of, allotted to divisions in 1917*, 288–9; *local carts requisitioned*, 170; *army transport carts used*, 172, 179, 204, 278, 334; *carts, in retreat from Dujaila Redoubt*, 222, 223–4, 614, 615; in East Africa, 431; in Aden, 510; throughout the war, 607–12; G.S. wagons as, 614; army transport carts as, 614–5; desert or sand carts as, 615–7.
American Army: troops in North Russia, 514, 527; *medical units for*, 530, 531–2; *sick in British hospitals*, 540.
Ana: advance to, 388–92.
Angus, Capt.: 55.
Anzac Corps: in the Mediterranean Expeditionary Force, 1, 2, *et seq.*; at Anzac, 7, 11; *in attack of 6th August*, 13–4; *on 21st August*, 16; *at time of withdrawal*, 17; medical arrangements for, in British force, 20, 21–2, 23; *in final stage of evacuation*, 52; medical units with, 23, 47; medical administration in, 24; work of medical units at landing, 26–7; casualties in, 31–2; *evacuated by minesweepers*, 36.
Anthonisz, Maj. E. G.: 554.
As Sahilan, Action of: 315–6.
Austen, Maj. E. E.: 59, 113.
Australian Hospitals: with the Mediterranean Expeditionary Force, 2, 20, *et seq.* (*see* Hospitals, in Gallipoli); No. 1 Australian Stationary Hospital transferred to Anzac, 42.
Aylmer, Maj.-Gen. Sir F. J.: 203, 209*n*.

Babtie, Surg-Gen.: 39, 40, 73, 104; his administration as P.D.M.S. in the Mediterranean, 37–8.
Baghdad: advance on, in 1915, 195–201; *withdrawal to Kut*, 201–2; advance to, from Shumran in 1917, 298–300, 301–5; photographs of, 305, 321, 357; medical organization in, after occupation, 320–24; *scheme for sanitary control*, 322–3; medical situation at and around, during summer of 1917, 339–45, 346.
Bahrein: 163.
Bailloud, Gen.: 12*n*.
Balfour, Lt.-Col. A.: 59, 249*n*, 503.
Banda: 431; photographs of, 430, 431, 450, 491; *of beehive huts*, 502.

Barges : in Mesopotamia, used in evacuating casualties, 164 ; heat stroke among troops on, 184 ; river steamers and, in Mesopotamia, 658–64 ; hospital, in Russia, 541, 548–9, 664 ; *photograph of*, 549 ; ambulance, in France, 656–8.
Barrett, Lt.-Gen. Sir A. : 163, 164, 165, 174.
Basra : operations leading to occupation of, 164–7 ; photographs of, 167, 211, 261, 350, 352, 353 ; organized as base, 169 ; medical units in, during early operations, 176, 179–82 ; hospital accommodation in, 210, 252–3 ; medical situation in, base area, *December 1915 to January 1916*, 210–16 ; *during period of reorganization, 1916*, 254–67 ; *on 9th April, 1917*, 346 ; medical situation at, *in 1917*, 349–55 ; *in 1918*, 355–8 ; unhealthiness of, 351.
Bassett, Lt. : 263.
Battey, Maj. : 44.
Beatty, Brig.-Gen. G. A. H. : 155.
Bedford, Surg-Gen. W. G. : 57.
Begg, Lt.-Col. C. M. : 61.
Belgian Expeditionary Force : in East Africa, 437, 444–5, 460–1, 462, 475, 480, 482, 484, 496.
Bellums : 171, 173 ; ambulance rafts fitted on, in advance to Amara, 185 ; used on Hamar Lake and after battle of Ramadi, 654–5.
Benares, H.H. the Maharajah of : ambulance tongas presented by, 612–3.
Beri-beri : 200 ; admissions for, during siege of Kut, 243 ; bad effect of, on healing of wounds, 244 ; admissions for, *to hospitals in Basra in 1916*, 256, 266 ; *in IIIrd Corps*, 343, 374.
Berrangé, Brig.-Gen. C. A. L. : 435.
Beves, Brig.-Gen. P. S. : 435, 461 ; in command of brigade in East Africa, 439, 440, 452, 453, 455, 469–70.
Biles & Co., Sir J. H. : 664.
Bingley, Maj.-Gen. : 255*n*.
Birdwood, Lt.-Gen. Sir W. : 1, 2, 16, 57.
Birrell, Lt.-Col. E. T. F. : 73, 75, 157, 158, 159.
Birrell, Surg.-Gen. : 2, 19, 34, 35, 37, 39, 46, 57 ; his statement of medical arrangements on Gallipoli Peninsula, 21–2.
Bizerta : 102.
Black Sea, Army of : disposition of troops, 153, 154–5 ; medical services, *in Constantinople*, 153–4, 162 ; *in Caucasus*, 154, 155–7 ; *with Thomson's and Malleson's forces*, 155 ; *in Samsoon and Trebizond, ib.* ; *with the British Mission in South Russia*, 157–9 ; *in Asia Minor*, 159–60 ; diseases in, 160, 162 ; *international committees for the prevention of*, 160–1.
Blackham, Col. R. J. : 529.
Blackwell, Maj. : 99.
Blackwater Fever : 454.
Blenkinsop, Surg.-Gen. A. P. : 335.
Bond, Col. J. H. R. : 375.
Botha, Brig.-Gen. M. : 435.
Boulenger, Lt. : 263.
Bowring, Hon. C. C. : 425.
Boyle, Lt.-Col. M. : 74.
Briggs, Lt.-Gen. C. J. : 67.
British Military Mission : in Sofia, 149 ; in South Russia, 157–9.
British Mission, with the Serbian Army : 101.
British South Russian Military Mission : 157–9 ; diseases among personnel of, 159.
Brits, Maj.-Gen. C. : 435 ; in command of troops in operations, 451, 454–5, 461.
Broncho-Pneumonia : 103 ; as complication of influenza in Persia, 404.
Brooking, Maj.-Gen. Sir H. T. : 193, 246, 308, 381 ; his column in operations on the Upper Euphrates, 381–96.

Brown, Col. F. J. : 44.
Brunskill, Maj. : 402.
Buchanan, Lt.-Col. G. S. : 59, 249*n*.
Buist, Lt.-Col. H. J. M. : 75.
Burke, Lt.-Col. E. T. : 402.

Cacolets : in Macedonia, 76–7, 121 ; mule, as used in Macedonia and Egypt, 595–6 ; mule harness adapted for, 596–7 ; camel, 598–603.
Campbell, Cmdr. V. : 517.
Canadian Hospitals : in Mudros, 40 ; in Macedonia, 84, 86, 89, 91, 92, 93 ; *photograph of*, 86.
Canelly, Mr. T. H. : 96.
Cardiac Debility : among troops at Gallipoli, 58.
Carrier Corps (East Africa) : 457, 473, 489; photographs of, 475, 477, 490 ; for evacuation of wounded, 467 ; hospitals for, 477 ; *photographs of*, 478, 491 ; *accommodation in*, 498; convalescent camps for, 477 ; statistics of disease amongst followers and, 479, 489–90 ; wastage in, 479 ; difference between labour corps in France and, 490 ; rations for, 491 ; error of administration of, 492 ; medical staff for, *ib.* ; recruitment of, stopped, *ib.* ; porter staff in native hospitals, 495 ; evacuation of, by sea, 498.
Carter, Maj. : 214.
Cassels, Gen. : 378, 379.
Casualties :
In Gallipoli : at the landing April–May 1915, 31–2 ; approximate number of, month by month, 57 ; statistics of disease, 57–8 ; *due to blizzard, November 1915*, 58 ; in the medical services, 60–1.
In Macedonia : on the Doiran front in 1916, *at Horseshoe Hill*, 119–20 ; *due to malaria*, 119 ; *at Machukovo*, 120 ; in Struma valley, 1916, 125 ; at battle of Doiran, 1917, *admitted to and evacuated from field ambulances*, 135–6 ; *among field ambulance personnel*, 137, 139 ; *between 8th and 10th May*, 137 ; *admitted to base hospitals*, 138–9 ; in 1918 offensive, 147, 148.
In Mesopotamia : at Saihan, 164 ; at Sahil, 166 ; before Qurna, 169 ; transferred to general hospitals from Shaiba, 174 ; tables showing, in early operations, 177 ; *percentage admissions for disease*, 178 ; in advance to Amara, 185 ; admissions for disease, May–August 1915, 188 ; sick and wounded in operations on the Karun, 190 ; in advance to Nasiriya, 191 ; before Kut, September 1915, 197, 199 ; during battle of Ctesiphon and subsequent retreat, 201 ; in Kut relieving force *at Shaikh Saad*, 205 ; *at the Wadi*, 207 ; *at Hanna*, 209 ; *at Dujaila Redoubt, and subsequent attacks*, 223, 224, 225, 226, 227, 228 ; in Kut, *before the siege*, 232, 233–4 ; *from bombs on hospitals*, 235 ; *average daily number of, under treatment, ib.* ; *among medical personnel, ib.*, 236 ; *total, from wounds and disease*, 243 ; *daily death rate*, 244 ; daily sick rate of 13th Division, June 1916, 247 ; numbers of sick and wounded admitted to and evacuated from Basra, January–April 1916, 256–7 ; numbers of sick admitted to hospital in Basra base area, *July 1916*, 259 ; *May to November 1916*, 263–7 ; numbers of sick evacuated by river and to India, 270–1 ; in attacks on Turkish positions at Kut, December 1916 to February 1917, 281, 283–4, 293, 298, 300, 307 ; in advance to Baghdad, February–March 1917, 305 ; during occupation of Nasiriya, 308, 315 ; percentage and number of admissions for disease in 15th Division, *at Nasiriya*, 317–8 ; *in Baghdad area*, 319 ; during operations for the consolidation of Baghdad, 325, 329, 333, 334 ; *total of sick and wounded, 12th March–3rd April*, 331 ; from wounds and heat in first attack at Ramadi, 340–1 ; from sickness in IIIrd Corps, 1917–18, 342–4, 374 ; local admissions to hospitals in Basra, *December 1916–September 1917*, 351 ; *October 1917–*

December 1918, 358; transfers to hospitals in Basra, December 1916–September 1917, 351, 358; evacuated to India, 355, 358; in operations *in Jabal Hamrin, 1917*, 360, 362, 368, 369; *north of Jabal Hamrin*, 372; in advance to Mosul, 379; at battle of Ramadi, 384; in advance to Ana, 389; admissions to hospital from Euphrates Force for sickness, 394.
In Persia: due to disease, 407, 408, 414, 415.
In East Africa: in attack on Tanga, 421; in Umba valley, *ib.*; for sickness, *ib.*, 465, 478–9, 489–90; *chart showing*, 466; in Kilimanjaro area, 1916, 431, 433; in operations against the Central Railway, 448, 449, 453; in Uluguru Mountains area, 455, 457; *percentage of, due to disease*, 457; in operations on the Mgeta front, 1917, 470; tables of, by years, 504.
In Aden: 507, 510; due to sickness, 509.
In North Russia: percentage of, to number of troops, 526; murdered in Russian mutiny, 536; in Murmansk force, *ib.*; during campaign, 540; sick in base hospitals, 540–1; hospital admissions for sickness, 555–6, 557, 558.
Casualties, Evacuation of:
In Gallipoli: problem of, 18–9, 20–1; at Helles and Anzac, 28–31, 46; improvement in, 32–4, 43; use of trawlers and minesweepers for, 35–6; wastage of stretchers used in, 45; at Suvla Bay, 48–9.
In Macedonia: from the entrenched camp positions in 1915–16, 80–2; *from Doiran and Struma fronts*, 82–6; by Itea and Taranto and Mediterranean lines of communication, 93–4; *alternative route considered*, 94; *malarial convalescents sent*, 97; during withdrawal from Serbia, 116–7; in actions on Doiran front, 119, 119–22; in Struma valley, 124, 126–31; in the Battle of Doiran *in 1917*, 132–5, 137–8; *in 1918*, 141–2, 142–4, 144–5; *in the advance following*, 146; from Bulgaria, 149–50, 152.
From Army of the Black Sea: 155, 156–7; in Asia Minor, 159.
In Mesopotamia: at Saniya, 164; at Saihan, 165; at Sahil, 165–7; *difficulties and deficiencies in*, 167–8; forward, contrary to field service regulations, 166, 167–8, 185, 198, 202, 205–6, 223; by river from Qurna, 169; from Ahwaz, 170; from Shaiba, 171; *difficulties of*, 172–4; lack of army bearer corps and measures taken for, 178–9; from Basra to India, 182–3; special arrangements for, from Amara by river, 185; on the Karun river, 190; by water from Nasiriya, 1915, 191–3; in advance to Baghdad, 1915, 195–7, 198–9; *breakdown of, at battle of Ctesiphon*, 201, 202; inadequate arrangements for, in operations for relief of Kut, *at Shaikh Saad*, 204–5; *at the Wadi*, 207; *at Hanna*, 209–10, 217–9; *arrangements for, on the lines of communication and to India*, 210–7; *at Dujaila Redoubt*, 222–4, 609, 614, 615; *mistaken policy of*, 223–4; *during period of trench warfare*, 226–31, 609; photographs illustrating, 219, 220, 230, 269, 324; from Tigris Corps, period of reorganization, after fall of Kut, 248–50; *on the lines of communication*, 251–2; improvement in, by river and sea, 1916, 267–72; arrangements made for, in advance to Kut, 1917, 274–80; during operations leading to capture of Kut, 281–2, 284–5, 286–8, 290–3, 293–4, 296–8; during subsequent advance to Baghdad, 298–305, 339; *arrangements on the lines of communication*, 305–7; from Nasiriya, 314, 654; difficulties of, due to A.D.M.S. not being informed of impending action, 316; scheme for, from Baghdad and surrounding neighbourhood, 323–4; during operations for consolidation of Baghdad, 325–6; *from the Feluja column*, 327; *from Keary's column*, 327–8, 329; *on left bank of Tigris*, 329–30; *distances covered in*, 331; *from Marshall's column*, 331–3; *at the battle of Istabulat*, 334–5; from attack on Ramadi, 1917, 340–1; from Jabal Hamrin in 1917, 359–60, 365–9; on Tigris, to casualty clearing station 30 miles away, 360–2; in operations north of the Jabal Hamrin, 372–4; during final operations on the Tigris, *of cavalry*, 379; *of*

infantry, 379–80 ; medical arrangements for, on the Euphrates, *at the battle of Ramadi*, 381–5, 654–5 ; *from Ramadi to Baghdad*, 385 ; *during further operations*, 388 ; *from Khan Baghdadi and in advance to Ana*, 389–92 ; proposed, by aeroplane, 398.

In Persia : 374, 411–2.

In East Africa : 425–6 ; arrangements for, in Kilimanjaro area, 429 ; from operations in Kilimanjaro-Meru area 1916, 431–2, 433, 436 ; *of sick*, 434, 437–8 ; *shortage of equipment for*, 438 ; during advance down Pangani river, 442–3 ; from British columns and Belgian forces, 1916, 444–5 ; from operations against Central Railway, *reorganization of*, 445–6 ; *during operations*, 448–9, 449–50 ; *want of organization for, and difficulties of, in Gen. Smuts' force*, 453–4 ; want of organization and difficulties of, in Uluguru Mountains area, 456–8 ; Europeans suffering from debility and malaria sent out of country, 458–9 ; difficulties of transport, 1916, 467–8 ; difficulties due to nature of country, 1917, 470–1, 472 ; re-organization of, 1917, 475–8 ; schemes prepared by D.M.S. for operations in the Kilwa-Lindi area, 1917, 485, 487–8 ; *medical units available for*, 488 ; *diagrams illustrating*, 478, 484, 488 ; overseas, 498.

In Aden : 506–7, 507–8, 509, 510–1.

In North Russia : in Murmansk area, 516, 527 ; from mobile columns, 517–8, 520–6 ; in Archangel area from forward areas, 532 ; by sea, 541 ; transport arrangements for, during summer, 546–7 ; *in co-operation with the Navy*, 548–9 ; arrangements for Russian sick taken over by Russian authorities, 551–2.

Casualty Clearing Stations :

In Gallipoli : 20, 21, 24 ; photographs of, 25, 26, 51 ; at Helles, 26 ; at Anzac, *ib.*, 33 ; for the Mediterranean Expeditionary Force, *at Mudros*, 36, 40–1 ; *at Kephalos*, 36 ; No. 11, warned by Turks to move, 42 ; at Anzac and Suvla, 46–7, 48 ; during withdrawal, 52–4.

In Macedonia : 80, 82–4 ; accommodation in hospitals and, 94–5 ; surgical groups organized for, 95 ; on lines of evacuation from Bulgaria, 149, 152 ; sent to Constantinople, 153 ; sent to the Caucasus, 154. (*See also* Casualties, Evacuation of, in Macedonia.)

With Army of the Black Sea : with Malleson's Force, 155 ; at Batoum, 155, 157.

In Mesopotamia : No. 19 Combined Clearing Hospital, 175 ; *opened on river steamers or transports*, 167, 168, 169, 186, 197 ; *distribution of sections of, Feb. 1915*, 176 ; *absence of army bearer corps personnel for*, 179 ; *sections of, as convalescent depot at Amara*, 187 ; *sections sent to Nasiriya*, 192 ; with Indian contingents from France, 213, 214 ; improvised from detachments of field ambulances, 223, 227 ; with Tigris Corps, 225 ; during period of reorganization, 1916, 248, 251 ; *field ambulances as*, 249 ; *on lines of communication*, 251–2 ; as stationary hospitals in Baghdad, 323 ; improvised, 331 ; distribution of, Apr. 1917, 346 ; in Baghdad, in 1918, 356 ; field ambulances as, in Euphrates Force, 383, 388, 389–90. (*See also* Casualties, Evacuation of, in Mesopotamia.)

In Persia : 402, 407.

In East Africa (*Clearing Hospitals*) : 426, 435 ; transport for, authorized 443 ; photograph of, 450 ; on lines of communication, Sept. 1917, 458 ; after reorganization of the force, 1916, 463–4 ; during reorganization of medical units in 1917, 475–6 ; for carriers, 477. (*See also* Casualties, Evacuation of, in East Africa.)

In North Russia : 516, 531, 540, 542, 551.

Cayley, Maj.-Gen. : 368, 372 ; Cayley's Force, 368, 369–72.

Cerebro-Spinal Fever : in Macedonia, 112 ; in Mesopotamia, 353, 374 ; in East Africa, 489, 490 ; *photograph of isolation compound for*, 465 ; *outbreak of, ib.* ; *absence of means for diagnosing*, 501 ; in North Russia, admissions for, 555, 556.

Chickenpox : 343, 374, 387, 394, 408.
Cholera : inoculations against, among troops on the Gallipoli Peninsula, 59 ; in Macedonia, 105 ; *precautions against*, 110 ; in Army of Black Sea, 156, 159, 160 ; in Mesopotamia, 247, 255, 342, 348, 363, 394 ; *during operations to relieve Kut*, 229 ; *admissions for*, to hospitals in Basra, May–Nov. 1916, 264–7 ; in 15th Division, 318 ; in IIIrd Corps, 374 ; in Euphrates Force, 394 ; amongst refugees in Persia, 413, 414 ; in North Russia, 515, 544.
Christophers, Maj. : 263.
Clarke, Lt.-Col. : 514.
Clearing Hospitals : *See* Casualty Clearing Stations.
Cleveland, Col. H. F. : 507.
Clothing : in Macedonia, *mosquito-proof*, 108 ; *suitable for heat*, 112 ; in Mesopotamia, 189, 229, 247, 249, 259, 342, 345 ; *hospital*, 255 ; in Persia, shortage of warm, 404 ; in East Africa, 434, 437, 441*n*, 457, 465.
Cobb, Lt.-Gen. : 333 ; Cobb's Column, *ib.*, 334.
Cochrane, Lt.-Col. E. W. W. : 381.
Colitis : in Mesopotamia, 190, 229 ; admissions for, in Mesopotamia, *for 1915*, 188 ; *to hospitals in Basra, May–Nov. 1916*, 264–7 ; *in 15th Division*, 318, 319 ; *in IIIrd Corps*, 343, 374 ; *in Euphrates Force*, 394.
Colville, Lady : 425.
Combined Clearing Hospitals : *See* Casualty Clearing Stations.
Commissions : Dardanelles, 18, 19, 32 ; Mesopotamia, 339 ; Vincent-Bingley, 255, 335, 339.
Committees : Sanitary Advisory, 59, 113 ; International Hygiene, *in Macedonia*, 105–6 ; *in Constantinople*, 160–1 ; Medical Advisory, 108 ; *in Mesopotamia*, 249, 335 ; Col. Hunter's Advisory, for the prevention of epidemics, 113 ; International Municipal, in Salonika, 113 ; Inter-Allied Sanitary, in Constantinople, 160–1 ; on recruits for Mesopotamia, 259 ; in Mesopotamia, to consider organization of medical services, 398*n*.
Comrie, Lt.-Col. J. D. : 554.
Connor, Lt.-Col. J. C. : 73.
Convalescent Camps : in Mesopotamia, 375 ; in Persia, 405, 410 ; in East Africa, 477.
Convalescent Depots : in Mudros, for troops on Gallipoli Peninsula, 36, 40, 41.
In Macedonia : development of, and accommodation in, 95–6 ; *chart illustrating, to face p.* 96 ; in Corfu, 96 ; No. 4, used as concentration camp in " Y " scheme, 97 ; sent to Constantinople, 154, 162.
In Mesopotamia : 187 ; at base, Basra, 181–2, 212, 214, 253 ; in Kut, 200, 234, 236 ; at Shaikh Saad, 253 ; at Mohammera, *ib.*, 262 ; *photographs of*, 262, 356 ; at Baghdad, 322 ; for IIIrd Corps, 342 ; medical situation in Apr. 1917, 346 ; for Indian troops and followers, 354–5 ; on lines of communication in 1918, 356 ; divisional, at Feluja, 396.
In East Africa : 446, 458, 496.
In North Russia : 534, 551.
Copinaris, Dr. : 105.
Corfu : 64, 101 ; convalescent camp and detention hospital in, 96.
Coryza : 554.
Cowley, Lt.-Comdr. : 245.
Cox, Maj.-Gen. : 11.
Craig, Lt. : 56.
Crewe, Brig.-Gen. Sir C. : 444, 445, 460.
Crowe, Brig.-Gen. J. H. V. : 418*n*.
Crowley cart : 464.
Ctesiphon : battle of, 201–2 ; photograph of country round, 199.
Cunliffe, Brig.-Gen. F. H. B. : 461, 469, 470, 480.

Dardanelles Commission : 18, 19 ; statement of number of French casualties in final report of, 32.
Davidson, Brig.-Gen. : 327.
Debility : 394 ; admissions for, in Mesopotamia in 1915, 188 ; deaths from diseases due to, in Kut, 243 ; in East Africa, 457 ; *Europeans suffering from, sent out of country*, 458–9.
Delamain, Brig.-Gen. W. F. : 196 ; Delamain's Force, 196, 197–9.
Delille, Méd.-Maj. A. : 43, 105.
de Lisle, Maj.-Gen. : 12, 15.
Denikin, Gen. : 157, 158.
Dent, Sir F. : 630.
Dental Centres : in Macedonia, 97 ; in Trans-Caucasia, 156 ; in Mesopotamia, 258, 313, 355 ; *at Baghdad*, 395 ; in East Africa, 458 ; in North Russia, 515 ; *mobile*, 551, 553.
Deventer, Lt.-Gen. Sir J. L. Van : 434, 437, 461, 479, 495 ; in command of troops during operations in East Africa, 430, 431, 433 ; *against Central Railway*, 445, 447–8, 449, 453 ; *in Iringa-Mahenge area*, 463, 469, 480–2, 488.
Diarrhœa : outbreak of, at Gallipoli, 59 ; accommodation for cases in Macedonia, 96 ; in Mesopotamia, 190, 229, 247, 394 ; admissions for, in Mesopotamia *in 1915*, 188 ; *during siege of Kut*, 243 ; *to hospitals in Basra, May–November 1916*, 264–7 ; *in IIIrd Corps*, 343, 374 ; *in Euphrates Force*, 394 ; in Persia, 411, 413 ; in East Africa, 450 ; in North Russia, 545, 557 ; *admissions for*, 555.
Diphtheria : in Mesopotamia, 343, 353, 374 ; in Aden, 510 ; admissions for, in North Russia, 555, 556.
Disinfection : at Gallipoli, 59 ; in Macedonia, 110 ; bathing and disinfecting trains in Caucasus and Trans-Caucasia, 156 ; in Don Army (Russian), 159.
In Mesopotamia : 383 ; at Basra, 181, 254 ; at Amara, 253–4 ; of Turkish prisoners and captured ship, 302 ; photograph illustrating, *ib.* ; at Shaikh Saad, 307 ; at Nasiriya, 318 ; of Turkish prisoners, *in Baghdad*, 320 ; *at Hit*, 393 ; in 15th Division on the Euphrates, 1918, 395–6 ; of refugees, 401.
In Persia, 408 ; in Russia, 553 ; *trains for*, 531 ; *van for*, 552, 553.
Dispensaries : civil, 187, 374 ; in Mesopotamia, 350–1 ; for refugees, 413.
Doiran, Battle of, 1917 : 131–9 ; map illustrating, *to face p.* 132 ; casualties at, *admitted to field ambulances*, 135–7 ; *among medical personnel*, 137, 139 ; *admitted to base hospitals*, 138 ; movements of divisions and brigades after, 139–40 ; *on the Struma front*, 140–1.
Doiran, Battle of, 1918 : 141–5 ; advance following, 145–6 ; number of casualties in, 147–8.
Doiran Front, Actions on, in 1916 : 117–22 ; maps illustrating, *to face p.* 118 ; 121 ; numbers of casualties, 119, 120 ; pack transport in, 121–2.
Dorgan, Lt.-Col. : 1, 35.
Douglas, Bt.-Col. H. E. M. : 540.
Dudgeon, Lt.-Col. L. S. : 59, 113.
Dujaila Redoubt : unsuccessful attack on, 220–4 ; evacuated by Turks, 246.
Dunsterville, Maj.-Gen. L. C. : 400 ; " Dunsterforce," *ib.* ; becomes North Persian Force, 402.
Dysentery : at Gallipoli, 58, 59 ; convalescent depot for, in Macedonia, 96 ; in Macedonia, 111 ; in Trans-Caucasia, 156 ; in Mesopotamia, 190, 247, 386 ; admissions for, in Mesopotamia, *in 1915*, 188 ; *during siege of Kut*, 243 ; *to hospitals in Basra*, 256–7, 264–7 ; *in 15th Division at Nasiriya*, 318 ; *in 15th Division in Baghdad area*, 319 ; *in IIIrd Corps*, 343, 374 ; *in Euphrates Force*, 394 ; high incidence of, in one unit at Nasiriya due to neglect of sanitation, 318 ; in Persia, 411, 413 ; in East Africa, 422, 450, 465 ; *statistics for*, 479, 489–90 ; *absence of laboratory organization for diagnosis of*, 500–1 ; in North Russia, 544, 545, 557 ; *admissions for*, 555, 556.

East Africa : political and physical geography of German, 416–8 ; organization of British and German forces in, 418–20 ; military operations in (*q.v.*) ; medical units with British forces in, 421–2, 429, 434–5 ; *reorganization of, in 1917*, 463–4 ; *accommodation in, in 1917*, 498 ; medical administration in (*see* Administration, Medical, in East Africa) ; medical situation in *on outbreak of war*, 422–4 ; *in 1914–15*, 424–7 ; *in February 1916*, 428 ; *after the reorganization of the force in 1916*, 463–8 ; *after reorganization of the force in 1917*, 474–9, 488–92 ; evacuation of casualties in (*see* Casualties, Evacuation of) ; ambulance transport in, 424, 431, 498–9 ; native medical corps in, 424, 475, 477, 493–6 ; health of troops in, 438, 441, 448, 450, 457, 465–7, 480, 483, 489–90 ; photographs of country, 440, 448, 452, 455, 460, 470, 480, 481 ; sanitation in, 449, 464, 465–6, 499–500 ; medical arrangements *for mechanical transport personnel in*, 474 ; *for carriers*, 475, 477, 490–2, 498 (*see* Carrier Corps) ; lack of measures for combating disease, 500–1 ; wastage of animals in, 501–2 ; housing of troops in, 502 ; report by Maj.-Gen. Pike and Col. Balfour on matters affecting the health of troops, 503 ; casualties in, 504 (*q.v.*).
Edwards, Brig.-Gen. W. F. S. : 435.
Egerton, Lt.-Gen. Sir R. H. : 363.
English, Lt.-Col. T. Crisp : 73.
Enslin, Brig.-Gen. B. : 435 ; in command of troops in East Africa, 452, 452–3, 454–5, 456, 461.
Enteric Group of Fevers : convalescent depot opened for, in Macedonia, 96 ; in Mesopotamia, 247, 248, 254, 342 ; admissions for, in Mesopotamia *in 1915*, 188 ; *in January–April 1916*, 256–7 ; *for enterica and enteritis, May–November 1916*, 264–7 ; *at Nasiriya, suspected*, 318 ; *in IIIrd Corps*, 343, 374 ; *in Euphrates Force*, 394 ; high incidence of, in one unit at Nasiriya due to neglect of sanitation, 318 ; in East Africa, 489 ; in North Russia, 553, 557 ; *admissions for*, 555, 556.
Enver Pasha : 245.
Evans, Lt.-Col. P. : 568.
Evans, Surg. A. G. : bed carrier invented by, 579.

Fane, Maj.-Gen. : 331 ; Fane's Column in actions in Upper Mesopotamia, 333–4.
Fanshaw, Maj.-Gen. : 378.
Fell, Col. M. H. G. : 246, 251, 263, 276, 335, 336.
Feluja Column : 327.
Fenwick, Dr. C. : carrying device invented by, 578.
Ferguson, Lt.-Col. J. D. : 96.
Ferguson, Col. N. C. : 73, 74.
Field Ambulances :
In Gallipoli : at landings at Helles and Anzac, 23–9 ; tent divisions of, on transports, 31, 32 ; with reinforcing divisions, 43–5, 47–8 ; photographs illustrating work of, 27, 28, 43–5, 49 ; workshop unit, 45 ; personnel and equipment separated on transports, 48 ; arrangements of 1/3 Lowland, for withdrawal from Helles, 55–6 ; motor surgical car with, 57.
In Macedonia : reorganization of ambulance transport of, 75, 78 ; photographs illustrating work of, 82, 118, 123, 126–7, 131 ; as hospital at Stavros, 82, 98, 103–4, 124, 141–2, 161 ; with Indian troops, 97 ; two, organized as non-mobile units, 98, 124, 141, 142, 161 ; section with British Mission, 101 ; in battle of Doiran, 1917, *numbers of sick and wounded admitted to*, 135–6, 137 ; *losses of personnel of*, 137, 139 ; (*See also* Casualties, Evacuation of, in Macedonia.)
With Army of the Black Sea : in Turkey, 153, 159–60 ; in the Caucasus, 154 ; with Thomson's and Malleson's forces, 155 ; at Samsoon and Trebizond, *ib.* ; in Trans-Caucasia, 156, 157.

In Mesopotamia: before hostilities, 163; acting as hospitals, 164, 165, 186, 187; *in Nasiriya*, 311–2, 317; at Ahwaz supplied with local carts, 170; organization, designation and distribution of, in original Indian Expeditionary Force, 175–6; *after occupation of Amara*, 186; in first advance on Baghdad, 195–6, 199, 200, 201, 236; in Kut, 202, 234, 235; divisions in action without, 203, 217; arrive without equipment, 203–4, 212; with the Kut relieving force (Tigris Corps), *ib.*, 224–5, 247; *improvised*, 204; *with Indian contingents from France*, 212–3, 217–8; acting as casualty clearing stations, 223, 227, 249, 331, 383, 388, 390; shortage of tents in, 250; numbers of stretchers allotted to, in Tigris Force, 278; organization of, in Nasiriya, 1916–7, 311–2, 317; with 15th Division near Baghdad, 319; new system of tentage for, 341; reorganization of Indian, 341–2; medical situation of, in April 1917, 346; at Baghaila, 348; in Baghdad, 356; with new Indian divisions, 375; on the Euphrates, 382, 388, 392–3; *mobility of, hampered by retention of infectious cases*, 387–8; prepared to act as casualty clearing stations in advance to Ana, 389–90. (*See also* Casualties, Evacuation of, in Mesopotamia.)

In Persia: 402, 405–7, 408, 410.

In East Africa: with British force in 1915, 421; in Uganda, 426; with forces in 1916, 429, 434–5; immobile, 428, 438, 471; distribution of, in July 1916, 449; on lines of communication, September 1916, 458; after reorganization of the force, 463–4; congestion in, 468; increase of, and reorganization of equipment of, in 1917, 475; increase of personnel in, 496. (*See also* Casualties, Evacuation of, in East Africa.)

In Aden: 507, 510; as hospital, 508, 509.

In North Russia: 516–7, 542; advanced dressing station formed by, with mobile column, 526; American, 530, 531; additional, to replace demobilized personnel, 551.

Field Ambulance Workshop Unit: 45; organization and work of, 622–3.

Finlayson, Brig.-Gen.: 514.

Firman, Lt.: 245.

Fitzgerald, Lt.-Col. T. O.: 439.

Fitzwilliams, Maj. D. C. L.: 554.

Flies: plague of, at Gallipoli, 59; spreading disease in Mesopotamia, 187; in East Africa, 422; *tsetse*, 441, 457; *Dodoma line free of*, 489; *entomologists' advice regarding*, 501; in North Russia, 546.

Forbes, Sir W.: 630.

Franchet d'Esperey, Gen.: 66.

Fraser, Maj. A. D.: 546*n*.

Frazer, Lt.-Col. G. S.: 168, 169.

French Army: division at Gallipoli, 1, 2, 7, 9–10, 11; Corps Expéditionnaire d'Orient, 12; *casualties in*, 32; laboratory work done by, 43; evacuation of wounded of, 46; on the Macedonian front, 62–3, 64, *et seq.*; medical services with Serbian Army, 101–2; helped by British medical service, 104; Stamboul taken over by, 150; troops in North Russia, 514, 516, 527, 539; *hospitals for*, 515–6, 543, 551; venereal cases allowed to mix with healthy troops, 558.

Frostbite: in the Gallipoli Peninsula, 58; in Macedonia, 111; in siege of Kut, 238; in North Russia, 526; *instructions on prevention of*, 518–9, 520; *admissions for*, 555.

Fry, Maj.-Gen. C. I.: 169, 196.

Gallipoli Peninsula: military operations on, 1, 2, 6–17; general medical situation before commencement of hostilities on, 1–2; Mudros as base for (*q.v.*); physical characteristics of, 3–6; maps of, 3, 8; photographs illustrating, 5–10, 14, 15, 25–8, 31, 32, 42–51, 60; French troops on, 7, 9, *et seq.* (*q.v.*); difficulties peculiar to campaign, 18, 18–9, 20, 27–8, 37, 45–6; medical administration (*see* Administration, Medical); medical arrangements *for landings at Helles and Anzac*,

19–25 ; *during landings*, 25–31 ; *during subsequent operations*, 35 ; *for combined attack at Helles, Anzac and Suvla*, 46–9 ; *for withdrawal*, 49–56 ; *sketch maps illustrating*, 24, 30, *to face p.* 49 ; use of hospital ships and transports for wounded from, 22, 22–3, 29–31, 32–4, 35–40 ; evacuation of casualties (*see* Casualties, Evacuation of,) ; medical units on, 23–4, 25–7, 43–5, 46–8 ; *stationary hospitals*, 23, 41–2 ; *bacteriological laboratories*, 42–3 ; *motor ambulance cars*, 45–6 ; *medical stores depots*, 23, 51 ; *sanitary sections*, 58 ; *rest camps*, 60 ; casualties (*q.v.*) ; use of trawlers and minesweepers for wounded, 35–6 ; Kephalos as hospital centre for, 41, 60 ; consulting specialists in, 43, 57 ; motor surgical car, 57 ; admissions for disease, 57–8 ; rations on, 58 ; sanitary conditions on, 58–9 ; disinfection of clothing on, 59 ; precautions against gas, 60.
Galwey, Maj. W. R. : 74, 75 ; bivouac net designed by, 108.
Gas Gangrene : in Kut, 244.
Gaskell, Fleet-Surg. : 24.
Geneva Convention : 36, 267*n*, 660, 663.
Gloucester, Maj. T. S. : 249.
Goodbody, Lt.-Col. : 251.
Gorringe, Maj.-Gen. G. F. : 174, 189, 190.
Gouraud, Gen. : 12.
Grappier, M. : 634.
Grayfoot, Col. B. B. : 220, 246, 249.
Greece : invaded by Bulgarian troops, 64 ; joins the Allies, 66 ; provisional government established at Salonika, *ib.* ; Director of Public Health asks for quinine for refugees, 106–7. (*See also* Hellenic Army of National Defence.)
Green, Sergt. R. G. : 564.
Greer, Capt. W. W. : 55.
Grogan, Brig.-Gen. G. W. St. G. : 535, 536.
Grove, Lt. : 263.
Guillaumot, Gen. : 66.
Gwalior, Maharajah of : 425.

Hall, Capt. D. : 656.
Hamilton, Capt. W. Heywood : 174.
Hamilton, Col. J. H. : 375.
Hamilton, Gen. Sir I. : 1, 2, 17*n*, 19, 39.
Hanforce : 487–8.
Hanna : first attack on, position, 207–10 ; later attacks on Falahiya and, 225–9.
Hannyngton, Brig.-Gen. J. A. : 434 ; in command of brigade in East Africa, 439, 441, 450–3, 455–6 ; in command of columns, 479, 484.
Harley, Mrs. : her work with the Scottish Women's Hospital in Macedonia, 101.
Harrison, Mr. L. : 249.
Hartigan, Miss : 532.
Harvey, Maj. A. W. M. : 217.
Hathaway, Surg.-Gen. H. C. : 174, 203, 204, 246, 263.
Heat, Effects of : in Macedonia, 112.
In Mesopotamia : 184, 185, 247, 248, 258, 332 ; admissions for, in 1915, 188 ; heat stroke stations opened, 258, 344 ; admissions for, in Basra, May–Nov. 1916, 264–6 ; occurring during transhipping, 272 ; admissions for in 15th Division *at Nasiriya*, 318 ; *in Baghdad area*, 319 ; high incidence of casualties from, during attack on Ramadi, 341 ; admissions to hospitals for, in 1917 and 1918 ; 342, 343–4, 374 ; measures adopted in divisions and on lines of communication for prevention and treatment of, 344–5 ; photograph of station for, 345 ; in base area, 1917, 352 ; admissions for, in Euphrates Force, 394.
In Aden : during operations, 506, 507, 509.

Hehir, Col. P. : 165, 174, 245.
Hellenic Army of National Defence : with the British Salonika Force, 66, *et seq.*; medical arrangements for, 103–4 ; casualties in, in 1918, 147, 148.
Henderson, Lt.-Col. P. H. ; 156*n*.
Hibbert, Capt. : 254.
Hobart, Maj. : 389.
Hodges, Lt.-Col. : 426.
Holt, Maj.-Gen. Sir M. P. C. : 74, 75, 162.
Horseshoe Hill, Action of, in 1916 : 118–9 ; numbers of sick and wounded during, 120.
Horsley, Col. Sir V. : 43*n*, 249.
Horton, Maj. : 174.
Hosken, Capt. : 630.
Hoskins, Maj.-Gen. A. R. : 434, 439, 461, 471, 479 ; in command of force in operations, 441, 451, 454.
Hospitals :
In Gallipoli : for the Mediterranean Expeditionary Force, 2, 20, 21, 22 ; *on transports*, 23, 31, 32–4, 35 ; *for Indians*, 40 ; for the Mediterranean Expeditionary Force, *at Mudros*, 40–1 ; *at Kephalos*, 41 ; at Helles and Anzac, 41–2 ; numbers cleared by ships from, at Mudros, 51 ; during withdrawal, 53–4, 54–5.
In Macedonia : 86–93 ; selection of sites for, 87–9 ; photographs of, 81, 86–92 ; accommodation *in casualty clearing stations and*, 94–5 ; *chart showing*, 95 ; *in convalescent depots and*, 96 ; detention, in Corfu, *ib.* ; for special groups, 96–7 ; in Lemnos and other islands, 99 ; with Serbian army, 100–1, 102–3, 152–3 ; on the Greek front, 103–4 ; movements and preparations of, for battle of Doiran, 1918, 142, 142–3 ; captured during advance, 146 ; transferred to Caucasus, 154 ; demobilized, 161–2.
With Army of the Black Sea : 153–4, 162 ; from India, 155 ; at Tiflis and Batoum, *ib.*, 156 ; at Chanak, 160 ; with military mission in South Russia, 157, 158.
In Mesopotamia : on transports, 165, 167 ; in Basra in 1914, 169–70 ; with original Indian Expeditionary Force, 175, 176, 179–81 ; for infectious diseases, at Basra, 181, 254, 354 ; voluntary, for Indians, 186, 187 ; field ambulances as, 186, 187, 311–2 ; photographs of, 211, 321, 353 ; in Kut, 202, 234–5, 236–7 ; *supplementary rations in*, 242–3 ; *operations performed in*, 244 ; shortage of personnel in, 211, 260 ; with Indian contingents from France, 212–3 ; congestion in, at Basra, 213–6 ; *enemy ship used as, ib.* ; development of, during period of reorganization, 1916, *on the lines of communication*, 252–3, 305 ; *at Basra*, 252–3, 254–5, 258, 262 ; establishments revised, 260 ; at Nasiriya, 311–4 ; increase of accommodation during Surg.-Gen. Treherne's administration, 336 ; medical situation of, Apr. 1917, 346 ; movements of, on lines of communication, 347–8, 349 ; development of, in Basra, 1917, 354 ; *photographs illustrating*, 353 ; vegetable gardens and poultry farms organized for, 395. (*See also* Mesopotamia ; Medical Situation.)
In Persia : 404–7 ; for officers, 406 ; on Persian lines of communication, 411–3.
In East Africa : with British Force *in 1915*, 421, 424–5 ; *in Uganda*, 426 ; *in 1916*, 428 ; " bandas " used for, 431 ; *photographs of*, 430, 431 ; on lines of communication, 1916, 435, 458 ; mobile units as, 438 ; photographs of, 456, 459, 461, 462, 465, 478, 491, 495, 496, 497 ; captured German, 456, 472 ; after reorganization of the force, 464 ; hospital ship as, 477 ; increase of, 496. (*See also* Casualties, Evacuation of, in E. Africa.)
In Aden : 505, 507, 508.
In North Russia : 515–6, 530–2, 541–2 ; railway trucks fitted as, 516 ; photographs of, 530, 541, 542 ; *of hospital train*, 532 ; Russian sisters

employed in, 532 ; accommodation in, in 1919, 540–1 ; daily average of cases from Navy and Allied forces in, *ib.* ; extra fatigue work necessary in, 542–4 ; diagram showing distribution of, in Syren Force, 543 ; taken over by Russians, 551–2.
Hospital Ships :
For Gallipoli : 20, 22, 36 ; memorandum regarding accommodation in, 21 ; accommodation on, 22–3 ; at the landings, 29–31 ; after the landings, 32 ; photograph showing loading of wounded on, *ib.* ; for Indian troops, 44 ; wounded embarked indiscriminately on, at Suvla, 48–9 ; numbers cleared by, from Mudros, Dec. 1915, 49–51.
For Macedonia : 82, 102 ; from Constantinople and Dedeagatch, 150, 152 ; passenger or cargo ships used as, in Caspian, 155 ; from Batoum, *ib.*
For Mesopotamia : given for troops, 182, 215 ; river steamers used as, 196, 197, 204, 205, 658–65 (*q.v.*) ; two additional, after battle of Ctesiphon, 211 ; ship fitted for prisoners of war, *ib.* ; transports and, relieving congestion at Basra, 214–6 ; photographs of, 230, 324 ; river, 268 ; numbers sent on hired transports and, to India, June–November 1916, 271 ; increase of, *ib.* ; complaints regarding transhipping of patients to, 271–2.
For East Africa : 424, 428, 464, 477 ; employed as hospital at Kilwa, 477 ; during 1917, 498 ; for native porters, *ib.*
In North Russia : 516, 532, 540, 541 ; photograph of, 529 ; improvised, 531.
Howse, Col. N. : 24, 57.
Hugo, Col. : 275, 335.
Hull, Maj. : 562*n*.
Hunt, a/Lt.-Col. E. R. : 554.
Hunter, Col. W. : 59, 110, 113.
Hunter, Surg.-Gen. G. D. : 428.
Hydroplane : surgeon conveyed by, 547.

Ice, Supply of : in Mesopotamia, 185, 189, 253, 332, 381 ; *factory at Nasiriya*, 194 ; *at Basra*, 258 ; *at Baghdad*, 344 ; in Aden, 505, 507, 509.
Imbros : *See* Kephalos.
Indian Army : brigades at Gallipoli, 11, 14 ; *hospital accommodation for*, 40 ; *field ambulances with*, 43–4 ; *hospital ships for*, 44 ; *work of Indian Army Bearer Corps*, *ib.* ; troops in Macedonia, 97 ; *medical units with*, 96, 97, 161 ; in Army of the Black Sea, 153, 155 ; *hospitals for*, 153–4, 155, 156 ; *convalescent depot for*, 154.
In Mesopotamia : 6th Poona Division, 163, *et seq.* ; medical units in original Expeditionary Force, 163, 175–6 ; convalescent depots for, 181–2, 253, 262, 342, 354–5 ; evacuation of wounded on transports, 182, 215, 270 ; voluntary hospitals for, 186, 187 ; arrival of reinforcements, 203 ; *medical units with*, 212–3, 225 ; personnel on hospital establishments, 211, 260 ; during siege of Kut, *sick and wounded in*, 233–4 ; *rations for*, 239–40, 241 ; *scurvy in*, 243–4 ; new divisions formed, 246, 247, 375 ; *medical units with*, 247, 311–2, 319, 375 ; Ist and IIIrd Indian Army Corps (Tigris Force) formed, 250–1 ; tongas for, 288, 289, 612–3 ; distribution of medical units, April 1917, 346.
In East Africa : 418–9, 420, 421, 422 ; *medical units in*, 421 ; *percentage of, in force*, 475 ; in Aden, 505–6, 507 ; *medical units with*, 505, 507, 510.
Inter-Allied Sanitary Committee : in Constantinople, 160–1.
Influenza : 103, 162 ; epidemic of, in Macedonia, 111 ; at battle of Doiran, 1918, 145 ; in Mesopotamia, 374, 375, 394 ; *admissions to hospital for*, 394 ; in Persia, 404, 405, 414 ; in East Africa, 504 ; in North Russia, 515, 554 ; *admissions for*, 555, 556.
International Hygiene Committee : 113 ; in Macedonia, 105–6 ; in Constantinople, 160–1.

International Municipal Committee : in Salonika, 113.
Ironside, Maj.-Gen. Sir W. E. : 527, 528, 536, 538.
Irvine, Col. G. B. : 174, 203, 206, 216, 217, 246, 309, 316, 381 ; his proposals for securing the health of troops in Nasiriya, 310–1.
Istabulat, Battle of : 334.
Italian Army : divisions on the Macedonian front, 64, 65, 94, 104, 130 ; Scutari taken over by, 150 ; in North Russia, 527 ; photograph of soldiers of, on skis, 517 ; teleferica (cable railway) used by, 627-8.

James, Lt.-Col. : 263.
Jamison, Maj. R. : 554.
Jaundice : 247, 248, 414 ; in Malleson's Force, 156 ; admissions for, in Mesopotamia, *in 1915*, 188 ; *to hospitals in Basra, May–November 1916*, 264–7 ; *in 15th Division, at Nasiriya*, 318 ; *in Baghdad area*, 319 ; *in IIIrd Corps*, 343, 374 ; *in Euphrates Force*, 394.
Jennings, Lt.-Col. J. W. : wheeled stretcher designed by, 585.
Jones, Col. T. P. : 44.
Jones, Miss B. : 255.
Julia, Méd.-Maj. : 102.

Keary, Maj.-Gen. : 220, 327 ; Keary's Column in Upper Mesopotamia, 327–9.
Keble, Col. A. E. C. : 2, 529.
Kemball, Maj.-Gen. : 220.
Keogh, Sir A. : 39.
Kephalos (Imbros) : 12, 16, 17 ; hospitals at, 41 ; sanitary section in, 58 ; rest camps in, 60.
Khalil Pasha : 229, 245.
Kitchener, Lord : 16, 34.
Kunhardt, Maj. : 263.
Kut-al-Amara : advance to, in 1915, 195–9 ; retreat to, 201–2 ; relieving force formed, 203 (*see* Tigris Corps) ; first operations for the relief of, 204–6, 206–7, 207–10, 216–7 ; subsequent operations for the relief of, 217–9, 219–20, 224 ; *at Dujaila Redoubt*, 220–4 ; *on left bank*, 225–7, 228–9 ; *on right bank*, 227, 229 ; attacks on Turkish positions at, December 1916–February 1917, 274, 280–8, 290–301 ; *medical preparations for*, 274–80 ; development of, port, 347, 348 ; medical situation in, section, 1917, 348–9.
Kut-al-Amara, Siege of : medical units in, 200, 202 ; at time of investment *preparations for receiving and clearing wounded*, 232–3 ; *defence of town*, 232, 233 ; *numbers of sick and wounded in*, 233–4 ; *strength of garrison in, ib.* ; accommodation and treatment of sick and wounded in, 234–6, 237, 243–4 ; casualties *from bombs dropped on hospitals*, 235 ; *average daily number under treatment, ib.* ; *among medical personnel, ib.*, 236 ; *total from wounds and disease*, 243 ; *daily death rate*, 244 ; supply of medical stores and comforts during, 237–8, 242–3 ; climatic conditions in, 238 ; diseases in, *ib.*, 243 ; sanitation and water supply in, 238–9 ; rations and medical comforts in, 239–43 ; effect of siege conditions on wounds, 243–4 ; operations performed during, 244 ; surrender of garrison, 244–5 ; classification of wounded for exchange, 245.

Labedens, Méd.-Prin. : 106.
Laboratories, Bacteriological : at Mudros and Gallipoli, 42–3 ; in Macedonia, 113 ; *in the Struma valley, 1916*, 130 ; *moved to Constantinople*, 154 ; *moved to Caucasus*, 154, 156 ; in Mesopotamia, 258, 313, 324 ; *organization and staff of, in 1916*, 263 ; in Persia, 405 ; in East Africa, 435 ; *want of organization for*, 500–1, 503 ; in North Russia, 552, 553, 557.
Labour Corps : medical arrangements for, in Macedonia, 96, 98, 162 ; in Mesopotamia, 394 ; *arrangements for*, 260–2 ; conditions of, in France compared with those in East Africa, 490–2.

Lake boats : use of in withdrawal from Serbia, 116, 652–3 ; bellums, in Mesopotamia, 171, 173, 185, 654–5 ; mahelas, 179, 185, 314, 654–5.
Lake, Lt.-Gen. Sir Percy : 229, 273.
Lamborn, Dr. W. A. : 501.
Laundries : in Russia, 544 ; *photograph of*, 545.
Lawson, Lt.-Gen. Sir H. M. : 99.
Ledingham, Lt.-Col. J. C. G. : 249*n*.
Legg, Col. T. P. : 275, 335, 366, 385, 390.
Leiper, Dr. E. H. : 113.
Lelean, Maj. P. S. : 59.
Lemaire, Méd.-Adj. : 105.
Lemnos : suggested base during operations on the Gallipoli peninsula, 1, 2 ; *unsuitability of, ib.* ; *becomes intermediate base*, 12, 13 ; R.A.M.C. establishment from Salonika force in, and other islands, 99 ; (*See also* Mudros.)
Lesbos : (*see* Mitylene).
Lewin, Brig.-Gen. : 371, 376, 378.
Lines of Communication, Medical Situation on :
In Mesopotamia : from November 1915–February 1916, 210–7 ; during period of reorganisation, 1916, 248, 251-4 ; *at Basra*, 254-67 ; during advance to Baghdad, 1916–17, 305–7 ; in 1917, 323–4, 345–55 ; *at Basra*, 349–55 ; in 1918, 355–8.
In Persia : 409–13, 414–5.
In East Africa : 423, 425–7 ; in Uganda, 426 ; in 1916, 428, 429–30, 435–6, 442–3, 446 ; in Uluguru Mts., September 1916, 457–9 ; after reorganization of the force, 1916, 464 ; in 1917, 476–8, 488–9 ; on Kilwa and Lindi, 488.
Linforce : 487–8.
Litters : in Macedonia, 76–8, 122, 590–1, 592–4 saddlery for, 596–7.
Llewellyn, Lady : 425.
Low, Col. Warren : 43*n*.
Lyall, Lt.-Col. : 470.

Macedonia : 16, 17 ; military operations in, 62–8 (*q.v.*) ; allied forces in, 62, 64–5, 66, *et seq.* ; road communications in, 68, 70–1 ; railway communications in, 68–9, 71–2 ; *on the Itea-Bralo route*, 72, 93–4 ; *alternative route*, 94 ; physical characteristics of, 69–70 ; *photographs illustrating*, 69, 71, 77, 81, 92, 94, 105, 122, 124 ; sea communications, 72 ; medical administration in, 73–5 (*see also* Administration, Medical) ; ambulance transport in, 75–8, 589–97, 609, 614, 652–3 (*q.v.*) ; motor ambulance convoys, 78–9 (*q.v.*) ; ambulance trains, 79–80 (*q.v.*) ; medical units in : *casualty clearing stations*, 80 (*q.v.*) ; *hospitals and convalescent depots*, 86–99 (*q.v.*) ; *medical stores depots*, 100 (*q.v.*) ; *with Allied forces*, 101, 102–4, 152–3 ; *other units*, 112–3 ; evacuation of casualties, 80–6 (*see also* Casualties, Evacuation of, in Macedonia) ; Indian troops in, 97 ; labour corps in, 98, 162 ; prisoners of war in, *ib.*, 152 ; medical personnel in, 99–100 ; problems of disease prevention in, 104–12 ; *malaria admissions*, 108–9 ; international committees, 105–6, 113 ; medical services, *during withdrawal from Serbia*, 114–7 ; *in actions on the Doiran front in 1916*, 117–22 ; *in actions in the Struma Valley in 1916*, 123–31 ; *in the battle of Doiran in 1917*, 131–41 ; *in the battle of Doiran, 1918*, 141–5 ; *in subsequent advance*, 145–8 ; distribution of formations and medical units after the Armistice with Bulgaria, 149–55 ; closing of Salonika base, 161–2. (*See also* Black Sea, Army of.)
Machukovo, Action of : 119–22 ; casualties during, 120 ; map showing positions of No. 66 Field Ambulance at, 121.
Mackintosh, Maj. A. M. : 44.
Maclean, Capt. : 573.

Macmillan, Capt. : 425.
Macneece, Surg.-Gen. : 214.
Macpherson, Surg.-Gen. W. G. : 73, 74, 160, 577*n*, 589 ; his plan for the anti-malarial campaign in Macedonia, 104–5 ; chairman of the International Hygiene Committee (Macedonia), 105 ; as D.M.S. First Army, France, 580, 644, 656 ; *his scheme for supplying stretchers to front line units*, 565.
Mahelas : 179 ; photograph of, *ib.* ; fitted for carrying wounded during advance to Amara, 185 ; as ambulance craft on Hamar Lake, 314, 654–5.
Maher, Col. J. : 1, 2, 35.
Mahon, Lt.-Gen. Sir B. : 16, 62, 63, 64.
Malaria :
In Gallipoli : 59.
In Macedonia : 74, 90, 102 ; " Y " scheme for, convalescents, 97 ; among medical personnel, 99 ; campaign against, 104–10 ; Greek refugees as carriers of, 106–7 ; outbreak in the Struma valley, 107–8 ; *quinine prophylaxis*, 108 ; statistics of admissions for, among British troops, 108–9 ; chart showing weekly admissions for, *to face p.* 109 ; during the actions on the Doiran front in 1916, 119, 120.
In Mesopotamia : 188, 190, 247, 348 ; admissions for, *during siege of Kut*, 243 ; *to hospitals in Basra in 1916*, 256–7, 264–7 ; *in 15th Division at Nasiriya*, 318 ; *in 15th Division in Baghdad area*, 319 ; *in IIIrd Corps, 1917*, 343, 374 ; *in Euphrates Force*, 394.
In Persia : 404, 414 ; malarial cachexia, 404, 410.
In East Africa : 422, 437, 441, 480, 483, 504 ; Europeans suffering from, sent out of country, 458 ; prevention of, not attempted, 465 ; statistics for, 478, 479, 489–90.
In North Russia : 555, 557–8.
Malleson, Maj.-Gen. Sir W. : 155 ; Malleson's Force, *ib.*, 156.
Malta : as base for Gallipoli, 1, 22, 34, *et seq.* ; time of return journey to and from Gallipoli, 35 ; as hospital base for Salonika Force, 72.
Manders, Col. N. : 24, 61.
Mann, Col. J. Bentley : 44.
Marshall, Lt.-Gen. Sir W. R. : 331, 363 ; Marshall's Column in operations in Upper Mesopotamia, 331–3.
Martin, Col. C. B. : 75, 162.
Mason, Lt.-Col. Brown : 174.
Maude, Lt.-Gen. Sir Stanley : 273, 318, 363.
Mawhinney, Lt.-Col. : 204.
Maxwell, Sir J. : 34.
Maynard, Maj.-Gen. : 514, 536, 537, 539.
McDermott, Lt.-Col. T. : 515, 529, 540.
McGrigor, Maj.-Gen. C. : 1, 12.
Measles : 254, 343, 374, 558 ; admissions for, in North Russia, 555, 556.
Medical Advisory Committee : 108 ; in Mesopotamia, 249, 335.
Medical Stores Depots : in Mediterranean Expeditionary Force, 22, 51 ; *at Gallipoli*, 23, 33 ; *at Mudros*, 36, 40 ; in Macedonia, 100 ; *in Struma Valley, 1916*, 130 ; *after battle of Doiran, 1918*, 146 ; moved from Salonika *to Dedeagatch*, 152 ; *to Constantinople*, 154 ; *to the Caucasus, ib.* ; *to Novorossisk*, 158, 162 ; *disbanded, ib.* ; with Malleson's Force, 155 ; at Batoum, *ib.* ; in Mesopotamia, 175, 182, 186, 195 ; *with reinforcements*, 213, 225 ; *in Kut*, 202, 232, 237–8, 242–3 ; *shortage of stores*, 216, 228 ; *in operations leading to capture of Kut*, 275, 279 ; *in Baghdad*, 320, 324 ; *medical situation, April 1917*, 346 ; in East Africa, 421, 426–7, 435, 458, 475, 476 ; in North Russia, 530, 541–2 ; *advanced, improvised*, 547–8.
Mediterranean Line of Communication : 72, 94, 97.
Melville, Col. H. G. : 335.

Mesopotamia : commencement of hostilities in, 163 (*see also* Military Operations ; physical characteristics *of Lower, ib.* ; *of Upper*, 363–5 ; ambulance transport in (*q.v.*) ; casualties in (*q.v.*) ; *evacuation of* (*see* Casualties, Evacuation of) ; Basra as base, 169 (*q.v.*) ; medical administration, 174, 246, 335 (*see* Administration, Medical) ; medical units *with the original Indian Expeditionary Force*, 175 ; *in Kut*, 200, 202 ; *with reinforcements*, 203, 212–3, 218, 224 ; *with Tigris Corps*, 225 ; *with new divisions*, 247, 311–2, 319, 375 ; *distribution of, April 1917*, 346 ; admissions for disease *in 1915*, 178, 188, 190 ; *in Kut*, 243 ; *in 13th Division*, 247 ; *in Basra*, 256–7, 259, 263–7, 270, 351–3, 358 ; *at Nasiriya, 1916–7*, 317–8 ; *in Baghdad area, 1917*, 319 ; *at Ramadi, from heat*, 341 ; *in IIIrd Corps*, 343–4, 374 ; *in Euphrates Force*, 394 ; sanitation in (*q.v.*) ; prisoners of war in (*q.v.*) ; arrangements for new troops at Basra, 212, 259 ; divisions in action without medical units, 217 ; adverse conditions affecting health of 13th Division in June 1916, 247–8 ; consulting specialists in, 249, 263, 275, 335 ; numbers evacuated to India, 256–7, 266–7, 271, 355, 358 ; difficulties in connection with reinforcements, 259 ; development of labour corps in, 260–2 ; improvement of river boat and hospital ship services, 1916, 267–72 ; Surg.-Gen. Treherne's administration, 1916–17, 335–9 ; heat stroke stations in, 344 ; medical arrangements for Persian refugees, 400–1, 412–3.

Medical Services : in operations *leading to the occupation of Basra*, 164–7 ; *leading to the occupation of Qurna*, 168–9 ; *at Ahwaz*, 170 ; *at Shaiba*, 170–4 ; *leading to the occupation of Amara*, 183–6 ; *on the Karun*, 189–90 ; *on the Euphrates to Nasiriya*, 190–4 ; preparations of, for first advance on Baghdad, 195–7 ; in attack on Es Sinn position, 197–9 ; in Kut, 199–200 ; *during siege*, 202, 232–45 (*see* Kut-al-Amara) ; at battle of Ctesiphon, 201–2 ; in operations to relieve Kut, *the battles of Shaikh Saad, the Wadi and Omm al Hanna*, 204–10 ; *subsequent actions*, 217-20 ; *attack on Dujaila Redoubt*, 220–4 ; *attacks on entrenched positions*, 224–31 ; reorganization of, *in the front areas*, 246–51 ; *on the lines of communication*, 251–4 ; *at Basra Base*, 254–67 ; during advance to Baghdad, 1916–17, *preparations of*, 274–80 ; *in preliminary operations*, 280–93 ; *in capture of Kut*, 293–8 ; *in subsequent advance to Baghdad*, 298–305, 339 ; not informed of action at As Sahilan (Nasiriya), 316 ; in operations for the consolidation of Baghdad, 325–35 ; at first attack on Ramadi, 340–1 ; in operations *in Jabal Hamrin*, 359–60, 365–9 ; *north of Jabal Hamrin*, 372–4 ; on Tigris, 360–2 ; *advance to Mosul*, 375–80 ; on the Euphrates, 381–3, 385–8 ; *at battle of Ramadi*, 383–5 ; *in advance to Ana*, 389–92 ; difficulties of, 397–8.

Medical Situation : during the early operations, 175–83 ; after the capture of Amara, 186–9 ; before the first advance to Baghdad, 195–6 ; before battle of Ctesiphon, 199–201 ; on the lines of communication, Nov. 1915–Feb. 1916, 210–7 ; at Ara, 218–9 ; in Kut, during siege, 232–45 (*see* Kut-al-Amara) ; during period of reorganization, 1916, *in front areas*, 246–51 ; *on lines of communication*, 251–4 ; *at Basra*, 254–67 ; on lines of communication during advance to Baghdad, 273, 305–7 ; at Nasiriya, 1916–17, 309–14, 317–8 ; at and around Baghdad during summer of 1917, 320–4, 339–45 ; on the lines of communication *in 1917*, 345–55 ; *in 1918*, 355–8 ; of medical units, April 1917, 346 ; in the Euphrates Force in 1918, 394–6.

Mesopotamia Commission : 339.

Michelham, Lord and Lady : 633.

Military Operations :

In Gallipoli : 1, 2, 6–17 ; the landings *at Helles*, 6–10 ; *at Anzac*, 7, 11 ; *at Suvla*, 14–6 ; moves and reinforcements of troops, 11–3, 15–6 ; attack *of 6th August, 1915*, 13–4 ; *of 21st August*, 16 ; withdrawal from the Peninsula, 16–7 ; subsequent distribution of troops, 17.

In Macedonia: 62–8; on the Doiran front in 1916, 117–8, 119; in Struma Valley, 123–4, 140–1; in Battle of Doiran, 1917, 131–2, 137; movements of troops, Nov. 1916–Dec. 1917, 139–41; in Battle of Doiran, 1918, 141, 144, 145–6; distribution of troops after the Armistice with Bulgaria, 149, 150–2.

With the Army of the Black Sea: 153, 154–5, 155, 157, 160.

In Mesopotamia: after declaration of war in Europe, 163; leading to occupation of Basra, 164, 165–6, 167; leading to occupation of Qurna, 168–9; at Ahwaz, 170; at Shaiba, 170–2; reorganization and reinforcements, 174; leading to occupation of Amara, 183, 184–5, 186; on the Karun beyond Ahwaz, 189–90; on the Euphrates to Nasiriya, 190–1, 194; in the advance on Baghdad in 1915, 195, 196, 197, 199, 201; retreat to Kut, 201, 233; arrival of reinforcements, 203, 224; for the relief of Kut, *the battle of Shaikh Saad*, 204–5; *at the Wadi and Hanna*, 206, 207, 210; *sketch map illustrating*, 205; attack on Dujaila Redoubt, 219, 220–2; further operations for the relief of Kut, 224, 225–6; composition of Tigris force, April 1916, 224; siege of Kut, 233; *strength of garrison at commencement of*, 234; *attempt to break blockade*, 244–5; *surrender of garrison*, 245; new divisions formed, 246, 247, 375; front held by Tigris Corps after fall of Kut, 246–7; renaming and division of Tigris Corps and formation of Tigris Force, 250–1; reorganization prior to advance on Baghdad, 1917, 273–4; leading to the occupation of Baghdad, 280–1, 282–4, 290, 292–3, 293, 294–6; *maps illustrating*, 283, 299; during the occupation of Nasiriya, 1916–17, 308–9, 314–5; *subsequent movements of troops*, 319; for consolidation of Baghdad, 320, 325; *on the Diyala*, 325, 327–8; *on Euphrates*, 327, 340; *on Tigris and Adhaim*, 330, 331–4; *position of troops after*, 335, 339, 341; in Jabal Hamrin, 359–60, 363–5; on Tigris, 360; north of Jabal Hamrin and in Persia, 369–72; final operations, advance to Mosul, 375–9; on Euphrates *at Ramadi*, 381, 383, 387–8; *at Khan Baghdadi and in advance to Ana*, 388–9; *subsequent distribution of troops*, 392, 394; demobilization, 396, 399.

In Persia: 369, 400, 401–2, 405; area occupied, 402–4.

In East Africa: forces engaged in, 418–20; on the frontiers and coast of German, *in 1914*, 420–1; *in 1915*, 421, 422; in Kilimanjaro-Meru area, Feb.–March, 1916, 427, 428–9, 430–1, 432–3, 433–4; military arrangements and organization, 1916, 434–7; after the occupation of Kondoa Irangi and in advance down Pangani river, 1916, 437–42; on the coast, 1916, 444, 459–60; in Victoria Nyanza area, 1916, 444; on Congo frontier, 1916, 444–5; against Central Railway, 1916, 445; *Van Deventer's force to Dodoma*, 447–8, 449; *General Smuts' force to Kilossa and Morogoro*, 450–3; in Uluguru Mts., 1916, 454–6; of minor and Allied forces in west, north-west and south, 1916, 460–1, 462, 463, 469; reorganization of force, 461; in Kilwa area, 461–2, 462–3; on Mgeta front, 1917, 469–70, 471, 473; further reorganization of the force, 1917, 473–4; situation of force in May 1917 under General Van Deventer, 479–82; advance from Kilwa, July–Nov. 1917, 482–5; in Kilwa-Lindi area (Hanforce and Linforce), 486–7, 488; final, 493.

In Aden: 505–6, 507, 508–9, 509–10.

In North Russia: aim of, 512, 516; in Murmansk area (Syren), 513–4, 527; *withdrawal from*, 539–40; in Archangel area, 514–5, 527–8, 529–30; relief forces for withdrawal, 535–6, 538; withdrawal from, 536–40.

Miller, Lt.: 55.

Milne, Gen. Sir G. F.: 64, 66, 67, 68, 153.

Mills, Capt. P. S.: 375.

Milne, Lt.-Col. A. D.: 423, 424.

Minesweepers: use of trawlers and, for bringing sick and wounded from Gallipoli to Mudros, 35–6.

Missions : British, with Serbian Army, 101 ; British Military, *in Sofia*, 149 ; *in South Russia*, 157–9 ; " Dunsterforce," 400.
Mitchell, Capt. T. J. : 246.
Mitylene (Lesbos) : 13, 99 ; typhus in, 110.
Mobile columns, in North Russia : 517 ; medical units with, 517–8, 520 ; *equipment of*, 523–4 ; evacuation of sick and wounded from, 520–4, 525–6 ; treatment of wounded in, 524–5.
Monro, Gen. Sir C. : 16, 57.
Morrison, Capt. : 263.
Morton, Col. H. M. : 224.
Mosquito nets : in Macedonia, *fitted to wheeled stretcher carriers*, 105, 560–1 ; *used by troops*, 107–8 ; *replaced by hospital pattern nets for sandflies*, 111 ; in Mesopotamia, 189, 255, 258 ; in Persia, 404 ; in East Africa, 441*n*, 457, 465 ; in North Russia, 546, 558.
Moss, Lt.-Col. E. L. : 516.
Mosul : advance to, 375–9 ; medical units in, 380.
Motor Ambulance Cars : at Gallipoli, 24*n*, 45–6 ; motor surgical car, 57 ; in Macedonia, 78, 78–9, 625 ; sent to Malleson's Force, 155 ; with military mission in South Russia, 157 ; in Mesopotamia, 190 ; *with Indian Expeditionary Force*, 179, 225 ; *with the Tigris Force, 1916–17*, 278, 288–90 ; *photograph of Ford*, 361 ; *for advance to Mosul*, 376 ; *number of*, 625 ; *types used*, 626–7 ; in East Africa, 424, 625 ; in North Russia, 548, 625 ; organization of, and types used *in France*, 617–25 ; *in Italy*, 625 ; *in Macedonia, Egypt and Palestine*, 626 ; *in Mesopotamia*, 626–7 ; orders regarding use of, 622 ; numbers of, out of action in 1918, 624 ; number of, at home and abroad, 625 ; number of types used in France, 1916, *ib.* ; lorries and buses, 627.
Motor Ambulance Convoys : in Macedonia, 78–9, 81 ; in the line of evacuation from the Doiran and Struma fronts, 84–6 ; *with the Greek forces*, 85 ; on the Doiran front in 1916, 119 ; in the Struma valley, 127, 130 ; at Battle of Doiran, *in 1917*, 135, 138 ; *in 1918*, 141, 142, 145 ; *during advance*, 145, 146 ; subsequent movements of, 149 ; transferred to Army of the Black Sea, 154 ; in Mesopotamia, 278*n* ; photograph of, camp, 352 ; work of, 353 ; authorized load too great for, in Jabal Hamrin, 369 ; in Persia, 407 ; in East Africa, 435, 443, 458 ; improvised in Aden, 510.
Motor Ambulance Launches : in Mesopotamia, 250 ; *" Aerial,"* 198, 227, 655 ; *increase in number of*, 336 ; *photographs of*, 338, 390 ; *design and depots of*, 655–6 ; in East Africa, 477.
" Mud " : 208.
Mudros (Lemnos) : as base for Gallipoli operations, 1, 2, 13, 16, 17, *et seq.* ; as intermediate base, 12, 22, 35 ; hospital accommodation in, 33–4, 36, 40–1 ; conditions at, 36 ; medical stores depots in, 36, 51 ; A.Ds.M.S. appointed for, 41 ; bacteriological laboratories in, 42–3 ; sanitary sections in, 58 ; R.A.M.C. establishment in, for Salonika force, 99.
Mumps : 265, 267, 343, 374, 387 ; admissions for, in North Russia, 555, 556.
Murphy, Capt. W. L. : 102.

Nasiriya : advance to, 190–3 ; description of, and surrounding country, 193–4, 308–10 ; sanitation in, 193 ; military operations during occupation of, 308–9, 314–5 ; medical situation in, 1916–17, 310–4, 317–8 ; photographs illustrating, 313, 315, 316 ; evacuation of casualties from, across Hamar Lake, 314, 654 ; want of co-operation between military and medical staff at, 316 ; medical units in, April 1917, 346.
Naumann : 479, 480, 482.
Neurasthenia : 209 ; in Russia, 533, 555.
New Zealand Stationary Hospital : in Salonika, 86, 92 ; transport carrying, torpedoed, 100.

Nickerson, Col. : 150.
Niclot, Méd.-Prin. : 105.
Nixon, Gen. Sir John : 174, 194.
Northey, Brig.-Gen. E. : in command of troops in East Africa, 445, 460, 462, 463, 469, 480, 482.
North Persian Force : formed, 402 ; area of, 402–4.
North Russia : military operations in, 512–5, 516, 527–8, 529–30, 535–40 ; allied forces in (*see* Russian, French, Serbian and Italian Armies) ; work of medical personnel in, 512–3 ; medical units with original British Expeditionary Force in, 515–6 ; medical administration (*see* Administration, Medical) ; medical situation in, *in Murmansk area* (*Syren Force*), 515–6, 516–7, 541–3 ; *with mobile columns*, 517–26 : *in Archangel area*, 530–5, 540–1 ; *before final evacuation*, 549–52 ; inhabitants and physical characteristics of, 516, 522, 533, 546 ; evacuation of casualties (*see* Casualties, Evacuation of) ; organization of mobile columns and accompanying medical units, 517–26 ; *memorandum on* " Hints and precautions for winter camps and sledging operations," 518–20 ; casualties (*q.v.*) ; nurses in, 532 ; mental depression of troops in, 533–4 ; effects of alcohol in, 534–5 ; difficulties of work in hospitals, 542–4 ; precautions for thaw, 544–5 ; ambulance transport in, 546–7, 604–7 ; *hydroplane used to convey surgeon*, 547 ; division of responsibility between naval and military medical authorities, 548 ; distribution of R.A.M.C. personnel before evacuation, 549–51 ; work of sanitary officers in, 552–4 ; diseases in, 553–4, 554–7 ; help given to Russian civilians, 553–4, 558 ; consulting specialists in, 554.
Nur-ed-din Bey : 195.
Nursing Sisters : at Mudros, 61 ; in Macedonia, 100, 104 ; *rest camp for, at Bralo*, 94 ; *drowned*, 100 ; in Mesopotamia, 260 ; *numbers of*, 212, 255 ; *with River Sick Convoy Unit*, 270 ; *increase in numbers of, 1916–17*, 336 ; *evacuated sick to India*, 355 ; *numbers admitted to hospitals in Basra, July–Dec. 1918*, 358 ; Russian, engaged in Persia, 404–5 ; in East Africa, 492 ; in North Russia, 532 ; *Russian, ib.*
Nussey's Mounted Brigade : 455.

O'Donnel, Surg-Gen. T. J. : 249.
O'Gorman, Lt.-Col. : photograph of stretcher devised by, (East Africa), 474.
O'Grady, Brig.-Gen. : 462, 479.
Opium : used to alleviate hunger during siege of Kut, 242.
Ophthalmic Centres : in Macedonia, 97 ; in Mesopotamia, 262, 355 ; in North Russia, 551.
Oriental Sore : admissions for, in 15th Division at Nasiriya, 318.

Paddle Steamers : in Mesopotamia (P boats), 185, 659–64 ; *used for evacuation of casualties*, 205, 209–10, *et seq.* ; *reorganized service of*, 267–8, 306 ; *photograph of*, 269 ; in Russia, 541, 546.
Paisseau, Méd.-Adj. : 105.
Paris, Maj.-Gen. : 11.
Paterson, Maj. T. G. F. : 247.
Pemphigus : 509.
Penny, Col. F. S. : 74.
Persia : 363 ; photographs of country, 362, 363 ; operations in North-West, 369, 400, 401 ; medical services in, 374 ; *with North Persian Force*, 400 ; treatment of refugees in, 400–1, 413 ; physical characteristics of occupied area, 402–4 ; *on lines of communication*, 409–10 ; medical situation in, 404–9 ; *on lines of communication*, 409–13, 414–5.
Philip, Capt. : 56.

Pike, Maj.-Gen. W. W.: 503, 568, 569.
Plague: 105, 160, 254, 352; precautions against, in Macedonia, 110–1; in Aden, 510.
Pneumonia: admissions for, in Mesopotamia, *in Kut*, 243; *in 15th Division at Nasiriya*, 318; *in IIIrd Corps, 1917*, 343, 374; *in Euphrates Force*, 394; in Persia, 404, 414; amongst carriers and followers in East Africa, 479, 489–90; in North Russia, 554; *admissions for*, 555, 556.
Poole, Maj.-Gen. F. C.: 513, 514.
Porter, Surg.-Gen. Sir J.: 38, 39, 40.
Portuguese Army: troops in East Africa, 445, 461.
Post Hospitals: in Mesopotamia, 350–1.
Prinkipo: 157.
Prisoners of War: treatment of, and hospital accommodation for, in Macedonia, 96, 98, 152, 162; British, in Turkey, 150, 153.
In Mesopotamia: 352, 372; arrangements for, taken at Ctesiphon, 211; exchange of, for British sick and wounded in Kut, 229, 231, 245; outbreak of relapsing fever and other diseases amongst Turkish, in March 1916, 254–5; condition of Turkish wounded, on captured steamer during advance to Baghdad, 301–2; treatment of Turkish wounded, left in Baghdad, 320; numbers *admitted to hospitals in Basra, December 1916–December 1918*, 351, 358; *evacuated to India*, 355, 358; at battle of Ramadi, 385; treatment and rations of, taken in advance to Ana, 393–4; problems of dealing with, 398.
In East Africa: British, supplied with quinine, 420*n*; German, 456.
P.U.O.: in Mesopotamia, 190, 248; admissions for, *in 1915*, 188; *to hospitals in Basra, May–November 1916*, 264–7; *in IIIrd Corps, 1917*, 343.

Quinine Prophylaxis: 189, 404, 420, 465; in Macedonia, 105, 107, 108; *photographs illustrating*, 106, 107.
Qurna: operations leading to occupation of, 168–9; unhealthy, 188; photograph of military bridge at, 252.

Railways: in Macedonia, 68–9, 71–2, 94; *field*, 72, 131, 149; *photograph of Decauville train*, 71; in Mesopotamia, 250, 251, 306; *to Nasiriya*, 259–60, 314; *in Upper*, 375, 380, 394, 410; *on Euphrates*, 387; *Basra to Baghdad*, 394; *arrangements for evacuation by light*, 276–7, 285, 373, 651–2; in East Africa, 417, 427, 436, 442, 468; *operations against Central*, 445–53; *motor traffic on repaired*, 460; *photograph of*, 482; *improvements in*, 473; evacuation of casualties by light, in France, 647–51.
Railways, Cable: 627–8.
Ramadi: attack on, July 1917, 340; battle of, September 1917: *preparations for*, 381–3; *military operations*, 383; *evacuation from*, 383–5, 654–5; evacuation from, to Baghdad, 385–8.
Rations: in Gallipoli, 58.
In Mesopotamia: 200, 218, 224, 229, 318, 356, 375; during siege of Kut, 239–43; *bad effects on healing of wounds of diminished*, 243–4; deficient in anti-scorbutic vitamines, 248; weekly reports on, instituted, 338; increase of vegetable, for Indians, 342; difficulty of transporting fruit and vegetables, in Kut section, 348; local garden established, *ib.*; in Euphrates Force, *for prisoners of war*, 393; *supplemented by farms, gardens and divisional fisheries*, 395.
In East Africa: 434, 456, 485, 486; *for African natives*, 490–1; in Aden, *thought deficient in calcium salts*, 509; *supplies of fruit and vegetables*, 511; for Russian civil prisoners increased on account of scurvy, 558.
Rawlinson, Gen. Lord: 537, 538.
Rawnsley, Col. G. T.: 74.

Red Cross Society : ladies of Greek, take over Greek refugee camps, 104 ; gifts sent by British, to Military Mission in South Russia, 158 ; in India, supplies gifts to sick and wounded in Mesopotamia, 183 ; gifts of, used in Kut, 237 ; British, 342, 383, 396 ; supplies stores and supervises buffets in Upper Mesopotamia, 366, 369 ; British, in Persia, 405 ; British, supplies motor launches in East Africa, 477 ; Indian, 478 ; South African, *ib.* ; hospitals in North Russia : *Russian*, 516 ; *American*, 530, 551 ; stores given to Russians, 551, 558 ; motor ambulance cars supplied by British, 625 ; ambulance train provided by British, 631, 632 ; motor launch repair depot of British, in Basra, 656.

Refugees : provision of quinine for Greek, 107 ; Russian, in camp at Prinkipo, 157 ; Jelu, in Persia, 400–1 ; *photographs of*, 401, 402 ; hospitals and camps for, 400, 405, 407, 412–3 ; Assyrian, 407 ; evacuated from North Russia, 538, 553 ; a source of venereal disease, 558.

Reilly, Col. C. C. : 57.

Relapsing Fever : 254, 320, 352, 374 ; in Indian mule corps in Macedonia, 111 ; outbreak of, amongst prisoners of war in Mesopotamia, 254–5 ; admissions for, in Basra, 1916, 256–7, 267 ; among prisoners on captured Turkish steamer, 301–2 ; in Persia, 408, 410, 414, 415 ; *causes of infection*, 414 ; absence of means of diagnosing, in East Africa, 501 ; in North Russia, 553, 555.

Rest Camps : 41, 56 ; formation of, at Imbros and Gallipoli, 60 ; at Bralo and Itea, 94 ; photograph of, *ib.* ; for nursing sisters at Bralo, *ib.* ; in Persia, 409.

Ridsdale, Mr. E. A. : 255*n*.

River Sick Convoy Unit (Mesopotamia) : 349, 353–4 ; organization of, 268–70.

River Steamers : used for sick and wounded in Mesopotamia, 169, 170, *et seq.* ; photographs of, 180, 230, 269, 306, 323 ; captured ships used as convalescent depots or hospitals, 181, 214 ; dressing station opened on, in advance to Nasiriya, 191 ; D.D.M.S. request for, refused, 193 ; as hospital ships, 196, 204, *et seq.* ; conditions on, *in retreat from Ctesiphon*, 202 ; *after battle of Hanna*, 209–10 ; improvement of, service *in 1916*, 267–8 ; *in 1917*, 306–7 ; formation of River Sick Convoy Unit, 268–70 (*q.v.*) ; equipped as mobile operating theatre for advance on Baghdad, 1917, 275 ; condition of Turkish wounded on captured, 301–2 ; organization and development of, 658–64, 665 ; river transport in North Russia, 541, 546, 547, 548–9, 553, 664.

Robinson, Brig.-Gen. : 170.

Robson, Col. Mayo : 43*n*, 49.

Roch, Lt.-Col. H. S. : 157.

Roche, Capt. J. J. : 515.

Rogers, Maj. J. A. Y. : 567 ; his trench stretcher, 279, 567–9.

Ross, Sir R. : 43*n*, 104, 108 ; asked to advise on means of prevention of malaria in Gallipoli, 59 ; his work in Macedonia, 104, 105, 113.

Rowan, Col. H. D. : 74.

Royal Navy : 1, 20, 38, 245, 254, 444, 459–60, 541, 548–9.

Ruotte, Méd.-Prin. : 105.

Russian Army : division on Macedonian Front, 64, 104 ; ambulance train in Trans-Caspia, 155 ; in Caucasus and Trans-Caucasia, *bathing establishments taken over from*, 156 ; *ambulance train*, 156–7 ; British Military Mission with General Denikin's Army, 157–9 ; typhus in, 159.

In North Russia : in operations with British Forces, 513, 514, 527, 539 ; organization and training of, 535 ; medical service for, organized, *ib.* ; mutiny in, 536 ; British support for, before evacuation, 537–8 ; after withdrawal of British, 538 ; hospital accommodation for, 540, 543 ; *on taking over from British*, 551 ; trained in sanitation, 553.

Ryan, Col. : 43*n*.

Sadleir-Jackson, Brig.-Gen. L. W. de V.: 535, 537, 538.

Sand Carts: 615–7.

Sandfly Fever: in Macedonia, 111, 113; in Chanak, 162; in Mesopotamia, 247, 248, 348; admissions for, *to hospitals in Basra, May–Nov. 1916*, 264, 266; *in 15th Division at Nasiriya*, 318; *in 15th Division, Baghdad area*, 319; *in IIIrd Corps*, 343, 374; *in Base area, 1917*, 352.

Sanitary Advisory Committee: appointed to investigate disease in Mediterranean area, 59; visits Macedonia, 113; in Mesopotamia, 249.

Sanitary Sections: with the Mediterranean Expeditionary Force, 58; in Macedonia, 112, 141; in Trans-Caucasia, 155–6; in Mesopotamia, 176, 182, 187, 213, 253, 262–3, 319, 375, 392; *divisional, returned to divisions*, 249; *in Amara, replaced by new units*, 253; *work of, at Basra in 1916*, 255; *work of, in Baghdad*, 322–3; *medical situation, April 1917*, 346; in Persia, 407; in East Africa, with British force *in 1915*, 421, 427; *in 1916*, 434–5; *in 1917*, 475; in North Russia, 515, 517, 530, 541–2, 552.

Sanitation: difficulties of, on the Gallipoli Peninsula, 58–9; work of Sanitary Advisory Committee, 59; of Salonika, 113; in Caucasus and Trans-Caucasia, facilitated by Russian equipment, 156; bathing and disinfection in Don Army (Russian), 159; in Constantinople and area of operations of Salonika force, March 1919, 160–1.

In Mesopotamia: 182, 249; conditions at Amara, 186–7, 254; system of, in Nasiriya, 193; difficulties of, increased by camping on enemy sites, 200, 385, 386; at Ora, 218–9; in Kut, 238, 238–9; in Basra base areas, 254–5; *in labour corps camps*, 261–2; *sanitary areas organized*, 262–3; on river steamers 1916, 268, 269–70; in Baghdad, 322–3; proposed divisional sanitary company for Euphrates Force, 386–7; difficulties and defects of administration, 398–9.

In Persia, 407–8; in East Africa, *deficient*, 449, 464, 465–6; *organized in 1917*, 499–500; *report on, by Gen. Pike and Col. Balfour*, 503; in Aden, 509; in North Russia, 515, 552–4; *sanitary appliances constructed before thaw set in*, 545; *immunity of British troops from dysentery due to*, 557; *baths*, 559.

Sarrail, Gen.: 62, 63, 66, 105.

Scabies: 555.

Scantlebury, Lt.: 56.

Scarlet Fever: 254, 387, 408, 553, 556, 558.

Scottish Women's Hospital: work of, in Macedonia, 101, 153.

Scurvy: 162, 178, 272, 342, 394, 509; admissions for, in Mesopotamia, 1915, 188; during siege of Kut, *admissions for*, 243; *wild plants used as preventive of*, 241; *other anti-scorbutics issued*, 241–2; *bad effect of, on healing of wounds*, 243–4; amongst Indian troops, 248–9; *artificially produced, ib.*; admissions for, *to hospitals in Basra, 1916*, 257, 265, 267; *in 15th Division at Nasiriya*, 318; *in IIIrd Corps*, 343, 374; *in Euphrates Force*, 394; in the Kut section, 1917, difficulties in obtaining fresh vegetables, 348; in North Russia, 513, 555; *in civil hospitals and prisons*, 558.

Seely, Brig.-Gen.: 568.

Septic Sores: at Gallipoli, 58; in Mesopotamia, 190, 247, 318.

Serbia: Allied Forces advance into, 62; withdrawal from, 162–3; *medical services in*, 114–7.

Serbian Army: 62; on the Macedonian Front, 64, *et seq.*; British and French medical services with, 101–3; evacuation of Serbians overseas abandoned, 102; typhus in, 110; troops in Russia, 513, 514, 516, 539; *hospitals for*, 515–6, 543.

Shackleton, Maj. Sir E.: 517.

Shaikh Saad, Battle of: 204–5; condition of wounded at, 205–6.

Shaikh Saad : as advanced base, 248, 251, 252, 345 ; as centre of evacuation during advance to Baghdad, 1917, 275–6, 305–7 ; units sent from, to Baghdad, 324, 347–8 ; medical units in, April 1917, 346 ; section merged into Kut section, 347.
Sheikh of Mohammera : 170 ; palace of, used as hospital, 180–1.
Sheppard, Brig.-Gen. S. H. : 434 ; in command of brigade in East Africa, 433, 439–40, 441, 450, 452–3, 454, 455, 469–70.
Skelton, Bt. Lt.-Col. D. S. : 224 ; dhoolie devised by, 576–7, 578.
Skyros : 2.
Slavo-British Allied Legion : 513, 514, 527 ; mutiny in, 536.
Sledges : instructions for sledging operations, 518–20 ; in North Russia, 523–4 ; *photographs of*, 524, 525, 528, 530–2, 606, 607 ; sand, 604 ; sleighs and, 605–7.
Sleeping Bags : in sledging operations in North Russia, 607.
Sleighs : 76 ; in North Russia, 604–5.
Sloan, Bt.-Col. J. M. : 220, 222, 285 ; his scheme for evacuating serious cases by aeroplane, 398.
Smallpox : 156, 159 ; in Mesopotamia, 342, 352, 387, 394 ; *admissions for*, 343, 374, 394 ; in Persia, 408, 413–4 ; in East Africa, 454 ; in Aden, 510 ; in North Russia, epidemic of, 554.
Smith, Col. F. : 74, 75.
Smith-Dorrien, Gen. : 427.
Smuts, Gen. : 427, 428, 437, 471 ; his description of conditions in East Africa, 418, 419 ; in command of force in East Africa, 444, 445, 450, 453, 454.
Snake Poisoning : outfits issued for treatment of, in Macedonia, 112.
Snow Blindness : in North Russia, 519.
Soltau, Col. : 573.
Sondermeyer, Col. : 102.
Southon, Maj. : 425.
Sparkes, Lt.-Col. D. M. : 402.
Spurrier, Dr. : 501.
Stammers, Lt.-Col. G. E. F. : 73, 74, 104, 110.
Starr, Col. W. H. : 249, 276, 285.
Statham, Lt.-Col. J. C. B. : 102.
Stephens, Maj. F. A. : 102.
Stewart, Brig.-Gen. J. M. : 420, 422.
Stewart, Lt.-Col. Purves : 43*n*.
Stopford, Lt.-Gen. Sir F. : 12, 15.
Streatfeild, Lt.-Col. H. : design of wheel attachment for ambulance stretcher by, 583.
Stretchers : wastage of, at Gallipoli, 45 ; exhibition of, in Macedonia, 76 ; field ambulances arrive without, in Mesopotamia, 263–4 ; numbers available in Tigris Force, 278–9 ; Rogers' trench, 279, 567–9 ; photograph of, devised by Lt.-Col. O'Gorman (East Africa), 474 ; modifications *of regulation field*, 560–3 ; *of American hand litters*, 563 ; Walton's hospital *ib.* ; disadvantages caused by irregular use of, 563–4 ; slings for, 564 ; drill, 564–5 ; supply of, to front line units, 565–7 ; trench, 567–74 ; cavalry, 574–6 ; blanket, 576 ; dandies and dhoolies, 576–7 ; hammocks and rigid cot type used in Cameroons, 577–8 ; hospital, 578–9 ; carried on mules, 594–5 ; mule harness adapted for, 596–7 ; diagram showing method of suspension in motor ambulance cars, 626.
Stretcher Carriers, Wheeled : 45 ; in Macedonia, 76, 78, 122 ; photograph of, 105 ; in East Africa, 424 ; types of, 579–88 ; diagram showing method of carrying Miller-James, in horsed ambulance wagon, 610.
Struma Valley : actions in, 1916, 123–30 ; *map illustrating*, 128 ; *number of casualties, 30 Sept.–4 Oct.*, 125 ; improvements of transport facilities in, 131 ; position in, during 1917–18, 140–1 ; *maps illustrating*, 139, 140, *to face p.* 141.
Suakim Expedition, 1885 : report on camel transport in, 599, 602.
Sutton, Col. : 73, 74.

Tafel : 488.
Tate, Col. A. E. : 220.
Tennant, Lt.-Col. : 389.
Tetanus : 279 ; during siege of Kut, 244.
The Wadi, Battle of : 206–7.
Thom, Col. G. St. C. : 1, 35, 529, 533.
Thomson, Maj.-Gen. Sir W. M. : 155, 402 ; Thomson's Force, 155, 156 ; *country occupied by*, 402–4 ; *medical situation in*, 404–9 ; *lines of communication for*, 409–13, 414–5 ; *measures taken by, in dealing with refugees*, 412–3.
Thorburn, Col. W. : 73.
Thornhill, Col. : 514.
Tidswell, Brig.-Gen. : 308.
Tighe, Maj.-Gen. M. J. : 421, 422, 428, 430.
Tigris Corps : organization of, 203–4 ; reinforcements for, 212, 217, 224 ; after reorganization in April 1916, 224 ; renaming and division of, and formation of Tigris Force, 250–1 ; operations of. (*See under* Kut-al-Amara).
Todd, Capt. H. C. : 375.
Townshend, Maj.-Gen. C. B. F. : 174, 183, 185, 201, 233, 245, 327.
Trachoma : in Macedonia, 112.
Tramways : in East Africa, 473, 476, 483 ; *photograph of*, 482 ; trench, 647–9.
Transports : 2, 18, 25, 150 ; torpedoed while carrying medical equipment and personnel *to Gallipoli*, 47–8 ; *to Macedonia*, 100 ; medical units divided and embarked on different, 48, 73, 78, 203, 212, 217.
In Gallipoli : use of, for the evacuation of casualties, 23, 29, 36, 48–9 ; as "ambulance carriers," 32, 37–8 ; conversion of, into stationary hospitals at sea, 33–4, 35 ; comments on the state of wounded in, 34 ; retain stretchers, 45 ; nursing sisters on, 61.
In Mesopotamia : used as hospitals for wounded, 164, 165, 167, 182 ; used in evacuating casualties to India, 182, 214–6, 270 ; *numbers sent by*, 271 ; *complaints regarding*, 271–2.
Travois : in Macedonia, 76, 77, 78, 122 ; *photographs of*, 77, 593 ; *description of litters and, used*, 589–94 ; in North Russia, 547 ; fronts where, were used, 589 ; mule harness adapted for, 596–7.
Treherne, Surg.-Gen. F. H. : 246, 263, 356, 626, 659 ; his administration in Mesopotamia, 335–9.
Trench Fever : in Macedonia, 111.
Tubby, Col. : 43*n*.
Tuberculosis : in North Russia, 555, 556.
Tyacke, Col. N. : 74.
Typhus : 59, 105, 156, 160 ; in the Serbian Army in Macedonia, 110 ; in the Russian Army, 159 ; in British Military Mission, *ib.* ; in Mesopotamia, 353, 374, 407 ; *among prisoners of war*, 255, 320, 352, 393 ; *among Jelu refugees*, 400–1 ; in Persia, 408, 410, 415 ; in North Russia, 553, 557.

Vegetable Gardens : 356 ; in Kut, 241 ; at Shaikh Saad, 348 ; photograph of local produce depots near Baghdad, 357 ; dairy and poultry farms and, organized in Euphrates Force, 395.
Venereal Disease : in Macedonia, 112, 162 ; *hospital for*, 96 ; in Trans-Caucasia, 156 ; *hospital for, ib.* ; in men of British South Russian Military Mission, 159 ; in Mesopotamia, hospitals for cases of, 181, 262 ; admissions for, in Mesopotamia, *in 1915*, 188 ; *to hospitals in Basra, 1916*, 256–7, 264–7 ; *in III rd Corps*, 343, 374 ; in Persia, 408, 411 ; in North Russia, 558 ; *admissions for*, 555, 556.
Vincent-Bingley Commission : 255, 335, 339.
Vincent, Sir W. : 255*n*.
Voluntary Aid Detachments : 100, 104 ; personnel of, in Macedonia, 99 ; voluntary aid nurses in South Russia, 159 ; photograph of Jelu, 402.
Vorbeck, Gen. von Lettow : 479, 488, 493.

Walker, Capt. : 56.
Wall, Col. F. : 285.
Wallace, Maj.-Gen. A. : 12.
Ward, Lt.-Col. : 149.
Waterston, Lt. J. : 113.
Water Supply : at Mudros, 1, 36 ; in the Gallipoli Peninsula, 6 ; *during evacuation*, 55 ; *ablution*, 59 ; in Macedonia, 70 ; *for the hospitals*, 88 ; *In Mesopotamia* : at Shaiba, 171 ; allowed for advance on Baghdad, 1915, 197 ; inadequate, at Dujaila, 223 ; defects of, during operations to relieve Kut, 229 ; photographs illustrating, *ib.*, 392 ; in Kut, 238–9 ; improvement in, 249 ; at Amara, 254 ; on river steamers, 268 ; in Tigris Force, 279 ; *for casualty clearing stations*, 284 ; for battle of Ramadi, 381, 382 ; *water supply column*, 384–5 ; in advance to Ana, 392 ; deficient sanitary organization for, 398–9 ; for mahelas on Hamar Lake, 654.

In Persia, 403, 411 ; *purification of*, 408 ; in East Africa, 440, 482 ; *in Mbuyuni area*, 427 ; *enemy's, at Mnacho*, 486 ; in Aden, 507 ; in North Russia, photographs of arrangements for, 523, 544.
Wauchope, Brig.-Gen. A. G. : his description of the sufferings of wounded at Samarra, 335.
Wenyon, Lt.-Col. C. M. : 113, 249*n*.
Weston, Maj.-Gen. Hunter : 2, 12.
Whitehead, Surg.-Gen. H. R. : 74, 75.
Willcox, Col. W. H. : 43*n*, 249, 335, 400.
Williams, Capt. : 424.
Williams, Maj. B. : 269.
Willoughby, Sir John : 419*n*.
Wilson, Lt.-Gen. Sir H. F. M. : 64, 67, 153.
Wilson, Sir Henry : 512.
Wimberley, Lt.-Col. C. N. C. : 247.
Wood, Lt.-Col. L. : 204.
Woodward, Maj.-Gen. E. M. : his memorandum on medical arrangements for landing on Gallipoli, 19–20.
Wounded (Mesopotamia) : left out all night, 166, 209 ; abandoned to enemy, 170 ; danger to, from Arabs, 172, 209, 334–5 ; lack of blankets and coverings for, 198, 206, 210 ; inadequate arrangements for feeding of, 206, 209 ; in retreat from Dujaila Redoubt, 222, 224 ; risk of drowning, 227 ; maltreated by enemy, 291.
Wounds, Bayonet : comparatively large number of, at Gallipoli, 32.
Wound treatment : in Mesopotamia, 362, 397–8 ; *during siege of Kut*, 244 ; *proposed temporary mobile surgical unit*, 386 ; in Russia, *necessity of early, on account of cold*, 524–5 ; *surgeon conveyed to patient by hydroplane*, 547.
Wrangel, Gen. : 159.

X-ray Units : 152, 155 ; photograph of lorry, Salonika, 95 ; in Mesopotamia, 175, 176, 181, 275, 313 ; in East Africa, 421 ; in North Russia, 515.

Yarr, Col. M. T. : 24.
Y.M.C.A. : in Mesopotamia, 382.
Young, Maj. A. W. Cook : 217.
Younghusband, Maj.-Gen. : 206, 220.
Ypres, Field-Marshal the Earl of : 101.

UH
258
1914/18
M32
v.4

Macpherson, (Sir) William Grant
(ed.)
Medical services

[redacted]

PLEASE DO NOT REMOVE
CARDS OR SLIPS FROM THIS POCKET

UNIVERSITY OF TORONTO LIBRARY